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One Hundred Years of Rainfall in Jerusalem

A Homotopic Series of Annual Amounts

N. ROSENAN

Israel Meteorological Service

FOREWORD

THE following notes are intended to explain the methods used by the author in his endeavour to prepare a hundred years' series of annual rainfall amounts for Jerusalem, which may be regarded as fairly homogeneous. More than a dozen years have elapsed since the author first became aware of the many breaks and instrumental mishaps that had occurred during the history of rainfall measurement in Jerusalem. He tried to collect all the evidence necessary for a reconstruction of the records, but was unable to do so in every case, owing to the loss of documents and other proofs through time and war. He wishes to express his indebtedness to his friends Mr. M. Gilead, director of the Israel Meteorological Service, and Dr. D. H. K. Amiran, of the Department of Geography of the Hebrew University, Jerusalem, who discussed this work in all its phases and helped to procure valuable evidence. He is particularly indebted to the late Mr. R. Feige, onetime director of the Meteorological Service, through whose untiring efforts the Meteorological Service received most of the original records of the old Jerusalem stations. Special thanks are due to Dr. J. Glasspoole of the British Meteorological Office, for valuable help in the procuring of proofs important for the reconstruction of the series.

INTRODUCTION

The first rainfall observation of modern times in Jerusalem was made in the month of January 1846; since then, with the exception of the rainfall year 1849/50[1] and the period January to May 1860, continuous observations of rainfall are available, although no single station carried on the whole time. Changes in instrumentation took place at some of the older stations — understandably considering the remoteness of Jerusalem from centres of supply in those days — but only rarely do we find the change of instruments recorded, and the notes are often ambiguous. Incongruities in the rainfall records were noticed by the observers themselves, and instrument comparisons took place as early as 1863; they continued, with interruptions, for half a century. Table 1 shows the most important of the old rainfall stations of Jerusalem up to World War I.

TABLE 1. RAINFALL STATIONS IN JERUSALEM, 1846-1914

Station	Grid reference (Palestine grid)	Height (m.)	Period of observation
English Mission Hospital, Old City .	17191315	760	1846-1848/49, 1850/51-1859, 1860/61-1914, 1940/41
German Colony . .	17131304	745	1895/96-1916
English Mission Hospital, New City	17061324	805	1897/98-1913/14, 1915/16, 1920/21-1947/48
American Colony . .	17181331	760	1898/99-1945/46, 1947/48[2]
St. Anne (Convent of White Fathers) . .	17241320	735	1909/10-1915/16, 1917/18-1947/48

DR. McGOWAN'S OBSERVATIONS (1846-1859)

Dr. McGowan, physician to the English Mission Hospital in the Old City of Jerusalem, began to make meteorological observations in a courtyard of the Mission Hospital[3] early in 1846. Rainfall records are known to exist from January 1846. A manuscript table of the monthly totals for 1846 to May 1849 and October 1850 to December 1855 was found in the archives of the British Rainfall Organization (Symons 1894). Monthly totals for the whole period

[1] A rainfall year in the summer-dry climate of Palestine runs from mid-summer to mid-summer.

[2] No data are available to the author for subsequent years for this and the following station.

[3] The courtyard of the building later called 'Watson Pasha House', a relatively open site, immediately south of David Street and west of the meeting point of the four quarters of the Old City.

of McGowan's observations until the end of 1859 were published on various occasions; Symons (1894), the founder of the British Rainfall Organization, re-edited the series. The mean annual rainfall amount for this period on the basis of McGowan's records is 69.9 inches (1776 mm.), with 44.0 inches (1118 mm.) and 98.2 inches (2494 mm.) for the extreme rainfall years in the series. It is obvious that McGowan made a consistent error in recording his observations, for we are aware that the normal annual rainfall at Jerusalem varies according to site and period between 500 and 650 mm. approximately. The existence of a consistent error was discovered very early, but its nature is still in doubt. C. W. Wilson (1865) assumed that the figures should be divided by four, which would give an average of 444 mm. for twelve rainfall years; this occurred only during the long drought of the mid-twenties to mid-thirties. We have no other evidence of a prolonged drought during the period of McGowan's observations; on the contrary, the level of the Dead Sea, which reacted appreciably to the drought during the twenties and thirties of this century, rose continuously during the forties, fifties, and early sixties of the last century. Symons (1894) ventured the hypothesis that McGowan had used an 8-inch raingauge together with a 5-inch measuring glass, which would bring the average annual rainfall amount for the McGowan period down to 694 mm., — still rather high. Symons' assumption is not correct, as we have at least one piece of direct evidence that McGowan did not use a raingauge which measures the volume of water, as do the ordinary 5-inch and 8-inch raingauges, but a Newman's float gauge,[4] which indicates the depth of rainfall (equal to rainfall amount) by a fixed mark against a rod set on top of a float which rises with increasing rainfall. Barclay (1857) quotes verbatim: '... the more extensive registration made at the Anglican Hospital under the superintendence of Dr. McGowan, according to Newman's gauge'. Symons thought he could exclude the possibility that McGowan had used a Newman's gauge, which under his successor 'recorded five per cent too little, whereas the record by Dr. McGowan seems about 156 per cent too great'. Whatever the recording error of McGowan, we possess comparative rainfall observations for one rainfall year at a nearby location, and these throw light on the enigmatic figures of McGowan and enable us to try a new reduction.

[4] Details of the Newman's float gauge, which was made in two sizes with apertures of 6 and 12 inches diameter, and showed a magnification of 1 in 10 on the scale of the rod, are given by Glaisher & Symons (1866). The 12-inch gauge seems to have been more common than the 6-inch gauge.

During the rainfall year 1853/1854, observations of rainfall were carried out simultaneously with Dr. McGowan's by R. Gutzlaff Barclay M. D., physician to the American Christian Mission which had its premises on the eastern margin of the Jewish quarter (grid reference 1722013145, h=750 m.). It may be assumed that the observations were carried out there. The monthly amounts of rainfall were published by Gutzlaff Barclay (1856?). They were obtained by means of 'quite an ordinary instrument; and not at all favourably situated for exact measurement' (Barclay 1857). From the general distribution of rainfall amounts in Jerusalem it may be assumed that the site of the American Mission would normally receive about two to three per cent less than that of the English Mission Hospital. Table 2 gives a comparison of the monthly and annual amounts at both stations, as well as the quotients.

TABLE 2. MONTHLY RAINFALL AMOUNTS, JERUSALEM 1853/54 (mm.)

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	TOTAL
A. English Mission Hospital . . .	—	152	315	335	508	615	274	—	2199
B. American Mission	5	58	91	112	147	165	91	13	682
$q = \frac{A}{B}$	x	2.6	3.4	3.0	3.4	3.7	3.0	x	3.22
$\frac{A}{3.22}$	—	48	98	104	157	190	85	—	682

Note: The original data for A and B are given in tenths of inches.

Inspection of Table 2 shows a ratio of 3.22 to 1 for the annual rainfall amounts of the two stations. This is confirmed by the monthly amounts, if due allowance is made for the possible need for adjustment (the rainfall may have been counted as occurring on the day of measurement or on the previous day, the day when most of the rain is supposed to have fallen). Furthermore, nothing is known about the time of observation. The fact that the data for the English Mission Hospital do not include records for the first and last months of the rainy season, whereas the other station records minor amounts, is a further proof that at the English Mission Hospital a float gauge was used: it was probably difficult to set the float in motion after a dry spell. The question whether the exposure of the American Mission station was unfavourable, as claimed by Barclay (1857), could not be solved. Considering its position with

regard to the prevailing winds during rain, it may even not have been unfavourable at all. A reduction factor of 1 : 3.14 was therefore assumed (i.e. 3.22 minus 2½ per cent for difference of normal rainfall) for the data of the English Mission Hospital during the period 1846 to 1859. The reason why Dr. McGowan may erroneously have multiplied the observations read off correctly from his raingauge by π (3.14) or by the square root of ten (3.16) may be assumed to be related to the properties of the Newman's float gauge.

DR. CHAPLIN'S OBSERVATIONS (1860-1882)

No rainfall observations are available for the months January to October 1860. In November 1860 rainfall observations were resumed by Dr. Thomas Chaplin, the new physician at the English Mission Hospital, obviously on the same site as before, and initially by 'the old-fashioned float gauge of Newman' (Chaplin 1883; Glaisher 1894). The chief disadvantage of Newman's float gauge, as stated by Chaplin (1883), 'is that, in consequence of the float displacing by its weight a portion of the water in the cylinder, the reading is usually too low, or no indication at all may be given, when the quantity of rain has been very small.' From a pencil remark in the original returns for the year 1873 it appears that the Newman gauge used was of the 12-inch type, as it is called the large gauge in distinction from the 8-inch Glaisher gauge which was also used. Owing to the disadvantage mentioned, the need for comparative measurements was felt early; already in October 1863, a 'Society's gauge' was used for comparative observations occasionally, and from January 1866 until April 1869 continuously.[5] This may have been a float gauge, since remarks mention the tube, body, and register of the gauge, a measurement with a rod, and the leaving of small amounts of water in the gauge to retain the float in water. The Society's gauge indicated daily rainfall amounts of one to five hundredths of an inch (0.2-1.2 mm.) which were generally not shown by Newman's gauge. In addition to these two gauges, a third raingauge appeared in May 1868: it was first called 'Negretti's new gauge' and later 'P. E. F. gauge No. 1226',[6] and seems to have been the

[5] This gauge might be an instrument supplied by the Scottish Meteorological Society after a visit to Dr. Chaplin by Dr. Keith Johnston Honorary Secretary of the Society which assumed the tutelage of the station from November 1863 onward (Buchan 1869). Nothing is known about the type of the gauge; its maker's number was 934, but the name of the maker is not known.

[6] 'P.E.F.' stands for Palestine Exploration Fund, which during this and the following year erected a network of meteorological stations in Palestine. This gauge seems to be identical with 'Glaisher's

eight-inch Glaisher-type raingauge which was in continual use at the Old City station until 1914. Four years of comparative readings of the Newman gauge and a well-functioning gauge during the years 1866/67 to 1869/70 show the output of the Newman gauge to be 95.3 per cent of the amount measured in the normal gauge. For the reduction of the years 1860/61 to 1865/66, however, a factor of one in 93.5 per cent was used.[7]

From 1870/71 onward we enter a period of reliable observations by both gauges, Newman and Glaisher. The Newman gauge sometimes shows more, as the difficulty of showing small amounts was overcome by leaving water in the gauge; it also proved 'as a collector more efficient than the other kind, when heavy rain and hail have fallen accompanied with much wind' (Chaplin 1883), probably owing to its larger orifice. For parts of the years 1873/74 and 1874/75 we have a certain check on the reliability of the data of the Old City station, since rainfall observations were then made at a moving station of the Survey of Western Palestine under the auspices of the Palestine Exploration Fund and the leadership of Lieut. C. R. Conder, R. E. During the two months of December 1874 and January 1875, when the P. E. F. observations were made near Christ Church (i.e. very close to the site of the English Mission Hospital), the rainfall totals recorded were as follows: Newman gauge 225 mm., Glaisher gauge 210 mm., P. E. F. gauge 228 mm. For the period 1866/67 to 1880/81, original data of the Society's or Glaisher gauge were used for the hundred years' series.

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gauge, as supplied by Negretti and Zambra' (Chaplin 1883) and with the 'certified 8-inch gauge by Negretti and Zambra' (Glaisher 1894). Both Chaplin and Glaisher mention six years of use of the Newman gauge (1860/61-1865/66), and four years of comparative readings 'side by side' (1866/67-1869/70). It is not important, for this report, to solve the riddle of what gauge was used for the observations during 1866/67 and 1867/68, which were recorded as made with the 'Society's gauge', since the year 1868/69, which reports data for both 'Society's' and 'P.E.F.' gauges, shows the minuteness of the differences in measurement: the annual totals for comparative readings are 588.7 and 591.6 mm. respectively. An enquiry at Messrs. Negretti and Zambra for details of the gauge supplied by them was without results, owing to the regrettable loss of their archives during the last war.

[7] The reason is that the treatment of the Newman gauge by Chaplin was not homogeneous. In January 1869 he discovered that leaving some water equivalent to 0.05 in. (1.3 mm.) or more in the gauge after observation would hold the float swimming and would lead to reliable recording even of small amounts the next day. This practice was maintained during January to May 1869 and produced a ratio of 100 per cent for this period, and of 98 per cent for the year 1868/69. As the remaining three years of comparison yielded a ratio of 92.5 per cent, and as another period of relative negligence of the treatment of the Newman gauge, during the period January 1889 to February 1891, showed a ratio of 94.5 per cent, a mean ratio of 93.5 per cent was adopted. The ratio adopted by Chaplin was 95.3 per cent.

THE P.E.F. PERIOD (1883-1914)

After Dr. Chaplin's departure early in 1883, the station at the English Mission Hospital came under the control of the Palestine Exploration Fund, which entrusted the famous English meteorologist James Glaisher with the supervision of the station and the analysis of the records, a task which he carried out until his death in 1902 at the age of 94. The observations were made by various local people, mainly pharmacists at the hospital. The two raingauges, Newman's and Glaisher's, were used, the Glaisher gauge regularly until the end of the rainfall year 1913/14 and the Newman gauge almost regularly until the end of the rainfall year 1896/97. During the last years of Dr. Chaplin's residence, a change in the relation of the results of the observations of both gauges had already taken place. During December 1880 the Glaisher gauge showed somewhat higher amounts than the other gauge. Against the date 15 January 1882 we find a remark in Dr. Chaplin's handwriting: 'Raining!! cause of difference could not be ascertained'. On this day the Newman gauge recorded 0.925 in. and the Glaisher gauge 1.115 in., whereas the day before the amounts measured by both instruments were equal. After that date the Newman gauge consistently showed less than the Glaisher gauge. Table 3 shows the ratios of the annual rainfall amounts measured with the two gauges as from 1870/71. It is probable that part of the change is due to the lesser degree of care taken in measuring the Newman gauge after Dr. Chaplin's departure. But this cannot explain the whole of the change, certainly not the sudden change on and after 15 January 1882.

TABLE 3. RATIO OF ANNUAL RAINFALL AMOUNTS
NEWMAN GAUGE : GLAISHER GAUGE,
ENGLISH MISSION HOSPITAL, OLD CITY, 1870/71-1896/97

1870/71	1.04	1879/80	1.08	1888/89	0.78
71/72	0.99	80/81	0.98	89/90	0.79
72/73	1.01	81/82	0.94	90/91	0.81
73/74	1.01	82/83	0.86	91/92	0.80
74/75	1.03	83/84	0.89	92/93	0.85
75/76	x	84/85	0.87	93/94	0.80
76/77	1.02	85/86	0.84	94/95	0.78
77/78	1.04	86/87	0.83	95/96	0.80
78/79	1.04	87/88	0.81	96/97	0.83

x Original records for most of the year missing.

It is well known that Glaisher gauges tend to deteriorate after years of service (Mill 1907; Salter 1921; Glasspoole 1947). A collar is soldered on to the top of the receiving funnel of the gauge which fits on the cylinder of the raingauge; the receiving funnel itself protrudes somewhat beyond the side walls of the cylinder, and an inverted truncated funnel which carries the aperture of the gauge is soldered on. In the course of time the collar loosens and eventually falls off, allowing rain-water, especially that driven by strong winds, to drip down the outer surface of the funnel into the raingauge. At a further stage, the soldering along the circle joining the two funnels may become defective, and water may get into the funnel at its joint. Mill (1907) reports the result of six years of comparative readings of old Glaisher and new Snowdon gauges at eight neighbouring stations; at five of these the Glaisher gauges were defective, the excess rain water received by them increasing from six to twenty-eight per cent. Glasspoole estimates the mean amount of deterioration of Glaisher gauges as 18 per cent. He stresses the fact that the measurement will be correct when a sound part of the funnel is in the direction of the wind. A uniform increase in the rain water entering the gauge is therefore not to be expected. It is highly probable that the Glaisher gauge of the Old City station shared the fate of its British companions. The observers at the Old City station after the departure of Dr. Chaplin certainly felt the discrepancy between the readings of the Newman and the Glaisher gauges. During the period January 1889 to February 1891 readings of a third raingauge are recorded in the original returns; of this only its makers are known — Messrs. Casella of London. The total rainfall during this period, taking the Casella records as 100 per cent, was 94.5 per cent for the Newman gauge, and 118.0 per cent for the Glaisher gauge (or a reduction factor of 0.848). The German meteorologist O. Kersten visited the station at the end of April 1895 and left there two raingauges for comparative observations (Kersten 1895). These gauges read in millimetres and were exposed, one with the orifice at a height of one metre above the ground, the other standing on the ground. From a remark in the records of the station at the new premises of the English Mission Hospital in the New City it may be inferred that these raingauges were of the 100-square centimetre type. Comparative readings of the two millimetre gauges with the Newman and the Glaisher gauges were carried out very carefully from 27 November 1895 until 14 February 1897 for the raingauge exposed on the ground, and until 26 March 1897 for the one metre gauge. Data for the two

German gauges were almost identical. For the period of measurement of the gauge exposed at one metre, taking again the amount measured with the German gauge as 100 per cent, the Newman gauge showed a total of 98.5 per cent and the Glaisher gauge of 121.2 per cent (or a reduction factor of 0.825). Both comparative series together comprise a rainfall amount of approximately 2890 mm. and result in a reduction factor of 0.8375 for the whole period of comparison. As the excess of rainfall measured by the Glaisher gauge is in agreement with the British experience, this reduction factor has been used to restore the annual rainfall totals for the period when only data from the Glaisher gauge were available from the Old City station (1897/98-1913/14). For the period of deterioration of the Glaisher gauge, as compared with measurements at the Old City stations by the Newman gauge and—occasionally—one of the three other gauges mentioned (1881/82-1896/97), either the results of the comparative gauges (Casella, German) were taken as such, with minor additions for incompleteness of measurements by the comparative gauges, or the results of the Newman gauge were taken, corrected with due regard to the degree of negligence in measuring small amounts. The results of the Newman gauge were almost identical with those of the Glaisher gauge until and including 1880/81. For the period 1889/91 the degree of negligence is expressed by a ratio of 0.945 between the results of the Newman gauge and those of the Casella gauge. In inspecting the original returns, we may assume that the measurements with the Newman gauge deteriorated only slowly after Dr. Chaplin's departure, that the drop in the ratio Newman : Glaisher from 0.87 to 0.84 before and after summer 1885 indicates the onset of negligence in observing small values with the Newman gauge, and that we are entitled to infer an increasing negligence, leading from a ratio of 1.0 in 1884/85 to 0.97 for the period January to April 1889, to 0.95 for the year 1889/90, and 0.94 for 1890/91. As the ratio Newman : Glaisher remained almost unchanged during the years 1890/91 to 1894/95, it is assumed that the degree of negligence remained constant throughout these years with a ratio of 0.94. The two years 1895/96 and 1896/97 with their numerous rainfall comparisons show an increased conscientiousness in the observers with a rise of the ratio Newman : correct gauges to 1.0 and 0.97 respectively. For certain years—e.g. 1891/92, 1893/94, 1894/95—for which data for Newman's gauge are incomplete, data from the Glaisher gauge were taken, and reduced by the relation Newman : Glaisher, with due consideration of the degree of negligence allotted to that year. As to

the year 1892/93, for which less than one third of the Newman data are available, the ratio Newman : Glaisher as well as the degree of negligence allotted to the two adjacent years were used in order to correct the Glaisher value. A certain check on this reduction is given by the fact that this year is uniformly the one of highest rainfall in a long series of years before and after at Haifa, Nazareth, and Jerusalem—the only stations with records at that time.

From the inception of rainfall observations at stations in Jerusalem other than the Old City, i.e. from 1895/96 and onward, maps at a scale of 1:10,000 were plotted for every year, and the annual rainfall amount for every station on the map was entered. The purpose of these maps was to check reduced values for the Old City against measured values at neighbouring stations. As a result of this check, it appeared that the annual rainfall amounts for 1901/02 and 1902/03, as reported by the Old City station, did not need reduction by the factor of 0.8375. For all the other years until and including 1913/14, reduced values for the Old City station fit in well to the network of other stations given in Table 1. No explanation can so far be offered for the correctness of the data for 1901/02 and 1902/03.[8]

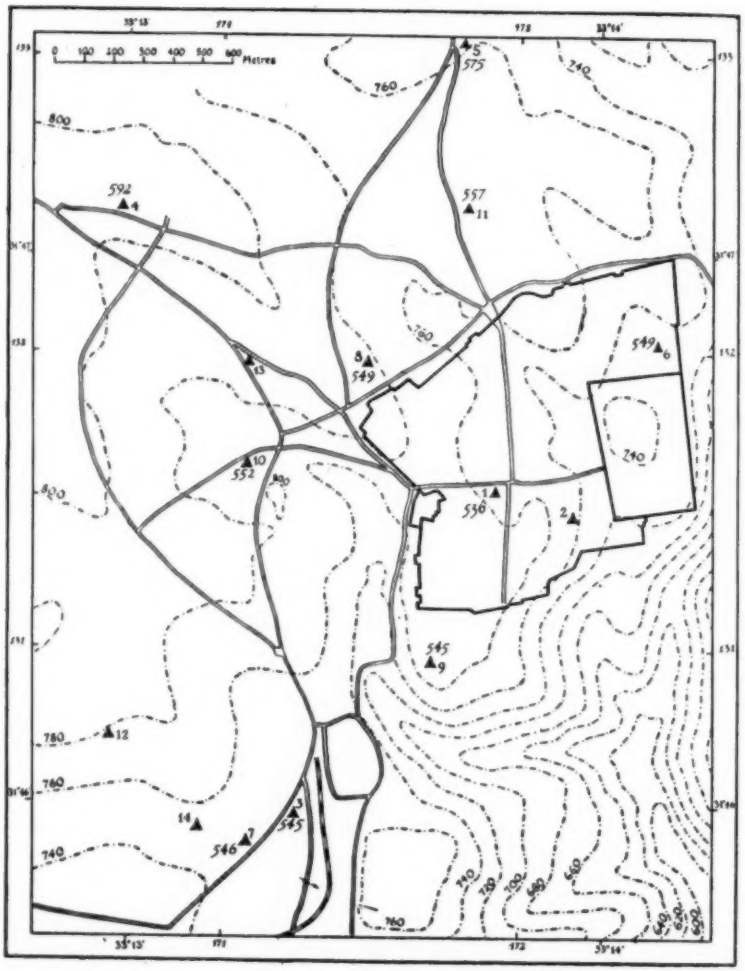
[8] The checking of the maps led to some scrutiny of the other stations. With the commencement of meteorological observations at the English Mission Hospital, New City (Prophets' Street), in 1897/98, a redistribution of the raingauges of the Old City station seems to have taken place. One of the German (mm.) gauges together with the Newman gauge was re-established at the new station, the other millimetre-gauge seems to have been given away to the American Colony in the north of Jerusalem for the inception of their observations in 1898/99: a raingauge with an orifice of 100 sq. cm. was found in action in 1938; the old Casella gauge (of 1889/1891) seems to have gone for one year of observations (1898/99) to a Reverend Kelk, whose figures are included in the New City station's return, and seems to have been used at this station in addition to the millimetre-gauge as from November 1902 after the observations by means of the Newman gauge had ceased in April 1902; these were rather unreliable during the period of observations at the New City station. In the return for 1899 we find a remark saying that '3 dms. equal 1 mm. for the 100-square cm. gauge.' As one dram equals 3.8879 gr., 3 drams would be 11.637 gr. or 16.64 per cent more than the 10 gr. needed for one mm. of rainfall in a 100-square centimetre raingauge. Therefore all measurements of the millimetre gauge from 1899 till 1914 seem to need the addition of 16.6 per cent in order to give correct readings. Indeed, a better fit is achieved with the adjusted figures on the annual maps; moreover, from 1906/07 to 1912/13 the adjusted values of the millimetre gauge agree very well with the values of the Casella gauge, which are also won by weighing ('1 inch = 11½ ozs. for Casella's 5' [sic!] Raingauge' in the return for 1907) and may be by 1.3 per cent too low. A 5-inch Casella raingauge was found at the place in working condition in 1940. Another incongruity in data can be corrected for the station at the German Colony. During 1906 rainfall was measured with two raingauges, one with an orifice of 50 square centimetres at one metre above the ground, and one of 100 square centimetres surface at six metres above the ground, on the roof (Dück 1907). The results of the roof observations were considerably higher than those at the lower level, possibly owing to the use of the same measuring glass without consideration of the

RECONSTRUCTION OF THE DATA FOR THE PERIOD 1914/15 TO THE PRESENT DAY

From 1914/15 onwards no rainfall observations were made at the site of the Old City station except during the year 1940/41, when one year of check observations was undertaken by officials of the Department of Civil Aviation of the Mandatory Government after special intervention by its director, D.W. Gumbley. For the remaining years it was necessary to compute the most probable amount of annual rainfall at the Old City station year by year. This was done by computing the deviation from a long period mean of the annual rainfall amounts of the Old City station on the basis of the percentage deviations from the means for the same long period of the annual rainfall totals of all surrounding stations, weighted inversely in proportion to their distance from the Old City station.[9] Table 4 shows the stations that were thus used for reduction during the period 1914/15-1947/48. For the years 1948/49-1953/54, after the division of Jerusalem into two parts, one belonging to Israel and

double orifice of the roof gauge. The higher amounts were published in the *Wiener Jahrbücher*. By reinstituting the observations taken on the gauge at one metre, reasonable amounts are obtained for the two rainfall years concerned (1905/06 and 1906/07).—Another error seems to have entered the records of the American Colony in a later period, but may be reported here. For the period 1917/18 to 1923/24 data for this station are conspicuously high when compared with neighbouring stations (St. Anne, New City). It seems likely that the observer at the American Colony, after learning of the discontinuation of the long series in the Old City after 1914, and in the New City and German Colony after 1916, wanted to do his best to continue the Old City series by erecting the old Glaisher gauge at his station alongside the millimetre gauge. As the Glaisher gauge showed higher values than the other gauge, and on the assumption that higher values are more trustworthy, he may have recorded the Glaisher values instead of the millimetre data. In any case, when we reduce the annual totals for these years by means of the factor used at the Old City, viz. 0.8375, we get values which for every one of the years in question are in good agreement with the neighbouring stations.

[9] The procedure was as follows: For every year the stations of reduction were selected according to their closeness to the Old City station, their length of run, and their reliability. Then the percentage deviations of the rainfall amounts from the normal for 1901-1930 at the stations used for reduction were computed. These percentage deviations were then multiplied by the reciprocals of the distances from the Old City station, and an average percentage deviation computed for the Old City station, which was then applied to the average annual rainfall amount of the Old City station for 1901-1930; thus the individual reduced annual rainfall amount was found. The long period averages of the period 1901-1930 were computed on the basis of the complete series for this period available from the station at the American Colony. A certain change in the annual rainfall amounts for the period 1917/18-1923/24 had to be made (cf. supra, n. 8). This change reduces the amount of mean annual rainfall as in *Climatological Normals* (1952) for all the Jerusalem stations. The 1901-1930 normal for the annual rainfall amount of the other stations was computed on the basis of the ratio of the total rainfall at the American Colony and at the station, for which the normal had to be computed, during the longest period of simultaneous and undisturbed run.



(Drawn by M. Karmon)

Fig. 1. Jerusalem—location of rainfall stations

1—English Mission Hospital, Old City;
2—American Mission;
3—German Colony—old series;
4—English Mission Hospital, New City;
5—American Colony;
6—St. Anne (White Fathers);
7—German Colony—new series;
8—Notre Dame de France;
9—Dormition Abbey;
10—Palace Hotel;
11—St. Étienne;
12—Talbiyeh;
13—Centre (General Building);
14—Rephaim.

Contour lines refer to Mean Sea Level.

Three-digit figures at stations indicate mean annual rainfall in mm. for period 1901-1930.

TABLE 4.

JERUSALEM RAINFALL STATIONS USED FOR THE REDUCTION OF OLD CITY ANNUAL RAINFALL AMOUNTS: 1914/15-1953/54

Station	Grid Reference (Palestine grid)	Height (m.)	Years of observation used	Mean annual rainfall 1901-30 (mm.)
English Mission Hospital, Old City	17191315	760	1940/41	536
German Colony—old series	17131304	745	1914/15-1915/16	545
German Colony—new series	17111303	745	1923/24-1938/39	546
English Mission Hospital, New City	17061324	805	1915/16, 1920/21-1935/36	592
American Colony	17181331	760	1914/15-1939/40	575
St. Anne	17241320	735	1914/15-1915/16, 1917/18-1929/30, 1932/33, 1935/36-1947/48	549
Dormition Abbey	17171310	765	1933/34, 1940/41-1947/48	545
Notre Dame de France	17151320	780	1930/31-1934/35, 1936/37-1947/48	549
Palace Hotel	17111316	770	1935/36-1946/47	552
St. Étienne	17181325	770	1941/42-1947/48	557

Note: The following stations were used for the reduction of the annual rainfall amounts of the Old City station during the years 1948/49-1953/54:

1948/49: Talbiyeh, Beth ha-Kerem, Romema;
1949/50: Centre (Generali Building), Beth ha-Kerem, Romema;
1950/51-1953/54: Centre, Rephaim (German Colony).

one to Jordan, reductions with equal weights were used, because of the general uncertainty of the reduction owing to the greater distances, the shorter run, and the partial unreliability of the data of the stations used for reduction. The reduction of the annual rainfall amounts from the Old City station was carried out on the lines of a trigonometrical resection. The surrounding stations used for the computation were chosen so as to encircle the Old City station as much as possible. Only when one or other of the surrounding stations showed for single years values which deviated too much from the general pattern of rainfall distribution, was it discarded as a basis of computation for that year. Four or five stations were most frequently used for the reduction for single years.

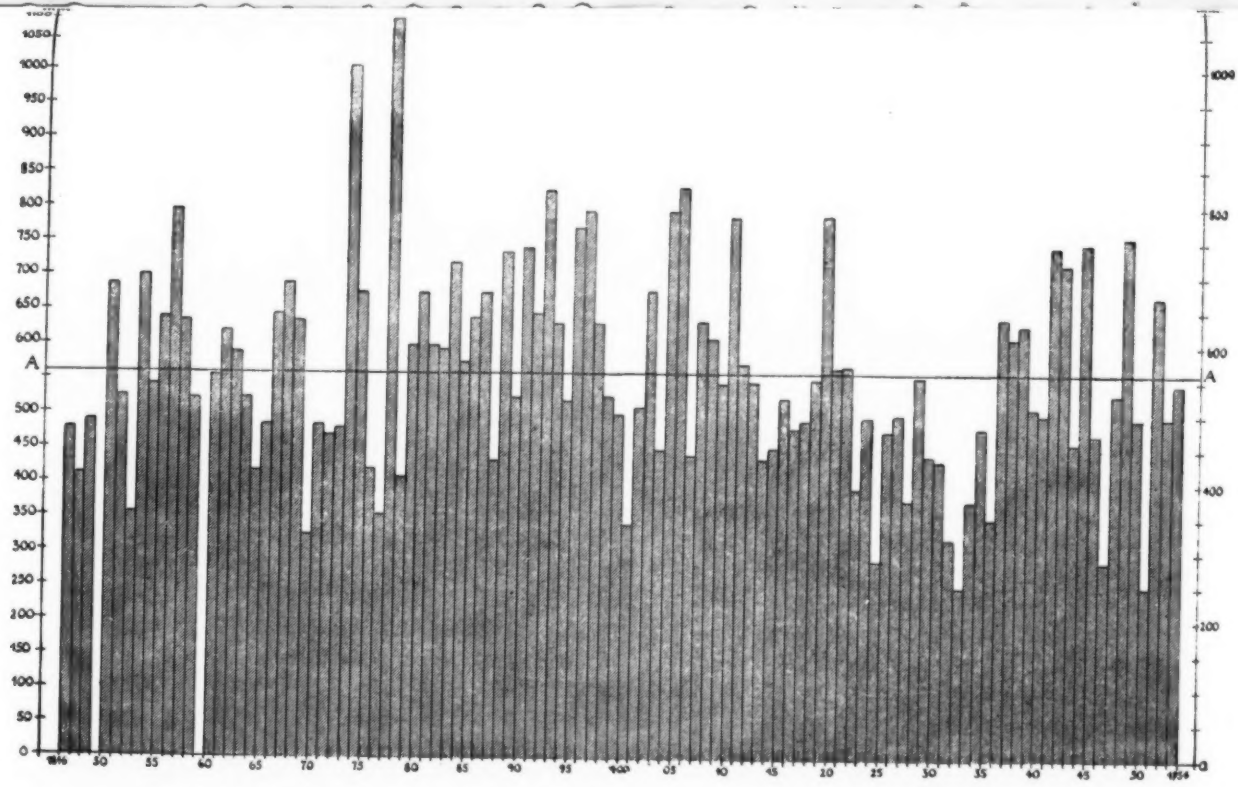


Fig. 2. Jerusalem, English Mission Hospital, Old City: annual rainfall amounts, 1846/47-1953/54, in mm.
A—A is the average value of the series: 560 mm. No data are available for 1849/50 and 1859/60.

(Drawn by M.Karmon)

TABLE 5. ANNUAL RAINFALL AMOUNTS, 1846/47-1953/54, AT JERUSALEM: ENGLISH MISSION HOSPITAL, OLD CITY (in mm.), RECONSTRUCTED SERIES

Years:	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/00
Decades:										
1840							477	412	490	x
1850	687	526	356	700	542	640	794	636	522	x
1860	557	623	588	523	419	486	643	689	633	318
1870	486	469	481	1004	676	419	353	1090	409	598
1880	675	598	584	718	575	638	674	433	731	524
1890	742	646	825	630	518	770	796	632	525	499
1900	339	509	678	448	794	828	441	633	611	544
1910	786	572	547	434	451	524	480	492	552	787
1920	567	569	392	496	278	476	499	376	556	440
1930	433	319	249	375	482	349	639	612	629	509
1940	500	742	718	457	748	470	286	529	757	494
1950	250	673	496	544						

Note: 1. Annual amounts based on measurements at the station, without adjustment: 1866/67-1884/85, 1901/02-1902/03, 1940/41 (22 years).

2. Annual amounts based on measurements at the station, with adjustments: 1846/47-1848/49, 1850/51-1858/59, 1860/61-1865/66, 1885/86-1900/01, 1903/04-1913/14 (45 years).

3. Annual amounts based upon reduction from measurements at other stations: 1914/15-1939/40, 1941/42-1953/54 (39 years).

When nearer stations were available, those farther away were discarded. In general, all directions between north-east and south over west were represented in the reduction of the station values surrounding the Old City station. No stations were ever established in the south-eastern quadrant of the Old City station, except for the American Mission station, which worked during 1853/54.

The year 1940/41, during which rainfall observations were renewed at the site of the Old City station, confirms the validity of the methods of reduction used in this investigation; it also confirms the reduction of the measurements made by means of the Glaisher gauge up to 1914/15, and those obtained from the deviations from normal rainfall of the surrounding stations. The computed value for the annual rainfall 1940/41 at the Old City station was ound to be 508 mm., whereas the measured value is 500 mm. This agreement may be regarded as satisfactory.

CONCLUSION

Table 5 gives the annual rainfall amounts for the whole of the reconstructed series, with a summary of the methods by which the figures were derived. It may be asked whether it would not have been better to choose another station with longer, more recent or more homogeneous records to build up a uniform series. The three competitors to the Old City station would have been German Colony, English Mission Hospital — New City, and American Colony. The German Colony station has 37 years of acceptable records, interrupted from 1916 to 1923, and continuing at a slightly different site;[10] it stopped in 1939. The New City station has 45 years of records, 7 of which needed adjustment, it stopped in 1948; observations were interrupted from 1914 to 1915, and from 1916 to 1920. The American Colony station has 48 years of uninterrupted records, of which seven years needed adjustment; it worked until 1945/46. If the subject of this investigation were the establishment of a homogeneous series of annual rainfall amounts for this century, the American Colony station would certainly be preferable. But as the Old City station antecedes any other station in Jerusalem by at least fifty years, it would have been unjustifiable to reduce these fifty years to values of the American Colony. Moreover, the reducing of values from one station to another is more reliable when based on many stations, as is the case with the Old City station from World War I to date. The checking of the data won by the inspection of maps of Jerusalem's annual rainfall gave further confidence in the method used, and this procedure would not be possible if the American Colony station were used to build up the homotopic series of one hundred years. The Old City station also commands a more central position than that in the American Colony.

The average annual rainfall at the Old City station for the period 1901-1930 is 536 mm.; the average for the period 1846/47-1953/54 is 560 mm.

It is clear that the series offered here must be homotopic, i.e. referred to one uniform and homogeneous site, the more so as Jerusalem is situated in a mountainous terrain with considerable variations of normal rainfall within a small area (see last column of Table 4). Otherwise it would not be possible to deduce climatic variations from the series.

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[10] The new Rephaim station has been functioning at a distance of less than 100 metres from the old sites since 1950.

It is hoped that this aim of establishing a homotopic series for Jerusalem has been attained. It is the author's opinion that those uncertainties which may have escaped his attention when establishing the series are of minor importance only.

No climatic or statistical interpretation of the series is offered here, but it may be published elsewhere. Further work on the lines of this investigation may be devoted to the establishment of similar series for the Tel Aviv area, for Haifa, Nazareth, Gaza, and Tiberias.

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Old Assyrian *ḫusârum* and Sanchunyâtôn's Story about Chusor[1]

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THERE is hardly any Old Testament scholar who is not confronted again and again with the question as to the age of the biblical traditions concerning that pre-Mosaic epoch which we are wont to call the period of the patriarchs. As is now generally admitted, a problem of this sort cannot be solved by literary analysis of the relevant biblical stories. It is therefore most important to sift the extra-biblical sources of the second pre-Christian millennium with a view to obtaining evidence relating to religious concepts, legal habits and other features paralleling the ideas and institutions reflected in the patriarchal traditions and thus to find an answer to the question as to the possible age of the legendary material handed down to us in Genesis. Babylonian and Assyrian sources dating from the nineteenth and eighteenth centuries have, in fact, furnished many a piece of pertinent evidence pointing strongly to the possibility that the Bible includes traditions basically as old as this extra-biblical material. An examination of the literary remains of the Semitic peoples who lived in regions closer to Israel's historic settlements furnishes less suggestive results. As far as the sources from the northern part of the Phoenician coast are concerned, this is, of course, due to the fact that we have so far no means of determining the period in which the literary texts found at Ugarit were in their formative stage. When turning to the ancient sources relating to the Phoenician cities further south which, in distinction from Ugarit, figure in the Bible, one meets with much the same situation. For Eusebius' excerpts from the book by

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Lists of the abbreviations used in the following pages when citing the editions of Old Assyrian texts, are found on pp. XVI ff. of the first volume and on p. IV of the second volume of the corpus *Die altassyrischen Rechtsurkunden vom Kültepe* by Georg Eisser and Julius Lewy (Leipzig, 1930-1935) and in *Orientalia*, 15, 1946, p. 382, n. 1. Texts published in Bedřich Hrozný's work: *Inscriptions cunéiformes du Kultépé*, Praha, 1952, are designated as *ICK*.

which, in the second Christian century, Philo of Byblos wished to acquaint the Greek-speaking world with the religious traditions of the people of Tyre, Byblos and, perhaps, Berytos leave us in the dark about the time of the Phoenician Sanchunyâtôn on whose writings Philo is said to have based his description of the Phoenician religion. New data shedding light upon the background of a tradition recorded by Sanchunyâtôn have therefore a claim upon the interest of historians of the religions of the Near East. But they also deserve to be brought to the attention of Old Testament scholars; for any evidence that the myths current among Israel's next-door neighbours ultimately antedate the eighteenth pre-Christian century suggests that cognate traditions handed down to us in Genesis may well have originated in the same remote period. In this sense, I consider it appropriate to deal here with information gathered above all from the Old Assyrian sources of the twentieth and nineteenth centuries B.C. As I have shown repeatedly in the last twenty-five years, these sources bear in many respects upon the Old Testament, even though they consist almost exclusively of commercial notes, business letters, promissory notes and other contracts, proceedings in court and the like.

Among the many articles of trade mentioned in those thousands of business letters and juridical documents figures sometimes a commodity designated by the term *ḫusârum*. Although this term occurs so far only in this particular group of Akkadian texts, which were unearthed at Kültepe and—in small numbers—at two other Assyrian settlements of Central Anatolia, it seems possible to determine its meaning.

A first most valuable indication as to the nature of the commodity called *ḫusârum* lies in the fact that three of the twenty commercial and legal texts which mention it[2] associate it with *amûtum*.[3] This association with *amûtum* is

[2] In addition to four unpublished texts of the Berlin Museum (cf. infra, n. 7 and n. 10), the Fisher Collection and the Kalley Collection (see B. Landsberger: Symbolae Hrozný, III. *Archiv Orientální*, 18, 1950, p. 332 [as against Bilgiç, *Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi*, 5, 1947, p. 440, n. 80]; B. Landsberger & K. Balkan: Die Inschrift des assyrischen Königs Īrišum, gefunden in Kültepe 1948, *Türk Tarih Kurumu, Belleten*, 54, 1950, p. 234, sub 4), these twenty texts comprise the following sixteen tablets: *BIN* IV 6; *CCT* IV 24a; 29b; 40a; *EL* 127 (see ll. 10b ff.: *1 ri-ik-súm* ^{11}*1/2* MA.NA *a-na ḫu-sà-ri-im* ^{12}*śa ik-ri-bi-a*); *EL* 331 (and dupl.; see presently, note 3); *EL* 332; *KTHahn* 11; *KTS* 22b; 30; 33b; *TC* 9 (see l. 10: *ši-im ḫu*(!)-*śá*(!)-*ri-kà*); *TC* 72 (see ll. 8b ff.: *2/3* MA-NA *5* GÍN ^{9}*ḫu*(!)-*sà*(!)-*ru*(!) *mì-ma a-nim* ^{10}*a-na Lá-qí*(!)-*ip*(!) *Ṭâba*(!)-*a-a* ^{11}*ù Ḫu-ud-ga*(!) *ap-qí-id*; thus according to a collation with the original done by me in 1932); *TC* II 9; 22; *TC* III 49. On *BIN* VI 89 see infra, n. 16.

[3] See the letters *KTS* 30 and *TC* II 9 and the proceedings in court *EL* 331 (duplicate of a text in the Kayseri Museum which was published by Landsberger, *Türk Tarih, Arkeologya ve Etnografya*

not accidental; for one of those three texts makes it perfectly clear that one and the same government office in the city of Aššur supplied either commodity to traders wishing to ship *ḫusârum* or *amûtum* from Aššur to Anatolia.[4] Since *amûtum* was, as is now generally admitted, a sort of iron,[5] this fact suggests that *ḫusârum* was likewise a metal or metal ore.[6] A comparison of the prices paid in Anatolia for the two commodities shows that *ḫusârum* was far less valuable than *amûtum*. Whereas the latter was so highly valued that people were sometimes ready to pay no less than 40 shekels of silver for a shekel of *amûtum*,[7] a shekel of *ḫusârum* realized at best about two and a half shekels of silver.[8] When we add to this evidence the fact that one text[9] describes an amount of six minas of *ḫusârum* as a bulky stone (*lakabbum*) and that another text mentions crushed *ḫusârum*,[10] we realize, indeed, that *ḫusârum* is more likely

Dergisi, 4, 1940, pp. 11 f.) and *EL* 332. *EL* 331 and *EL* 332 deal with one and the same shipment of *amûtum* and *ḫusârum*.

[4] See *TC* II 9,3 ff.: *a šu-mì a-mu-tim ù ḫu-sà-ri* [4]*ša ta-áš-pu-ra-ni bît li-mì-im* [5]*ù-lá i-du-nu mì-ma* [6]*ú-ṣa-kà lá i-ba-ší*. A cognate passage is found in the letter *CCT* IV 24[a]; see ll. 53 f.: [*x*]*ù-dí-na-tí-ni nu-lá-qí-it-ma a-na kaspim* [*ni-dí-ma*] [54][*š*]*í-im ḫu-sà-ri-e a-na* [*bî*]*t a-lim nu-uš-*[*ta-qí-il*$_5$]. (As for the virtual identity of the *bît limim* and the *bît âlim*, which figures also in *TC* 21,19; 25; *TC* 29,44; *TC* II 43,23; *BIN* IV 220,20; *BIN* VI 56, x+1; *BIN* VI 197, x+11 f.; *ICK* 17,27, see *TC* 21,4-19.) See also *TC* II 23,31[b] ff.: *a šu-mì* [32]*a-ší-im ša ta-áš-pu-ra-ni* [33]*li-ma-am ni-kà-ší-ma* [34]*šu-ma i-ta-áb-ší a ma-lá* [35]*té-er-tí-kà ni-lá-qí*. As was noted by Landsberger: Symbolae Hrozný, III. *Archiv Orientální*, 18, p. 331, n. 14, the synonymity of *amûtum* and *aš'um* is, inter alia, suggested by the comparison of this latter passage with *TC* II 9,3 ff.

[5] See J. Lewy: *Die Kültepetexte aus der Sammlung Frieda Hahn*. Leipzig, 1930, p. 16; Landsberger, *loc. cit.* (supra, n. 4), p. 331; A. Salonen: *Die Landfahrzeuge des alten Mesopotamien*. Helsinki, 1951, p. 148. For data favouring the view, based upon its ideogram KÙ.AN, that *amûtum* denoted, at least originally, the meteoric iron, see H. J. Plenderleith apud C. L. Woolley: *Ur Excavations*, II. London, 1934, p. 293.

[6] The fact, briefly mentioned by Landsberger, *loc. cit.* (supra, n. 4), p. 332, sub 2, that an unpublished tablet of the Kalley Collection mentions in addition to 30 minas of *ḫusârum* small amounts of iron (*parzillum*) points in the same direction.

[7] Thus according to *KTS* 39[a] and *VAT* 13534. The letter *BIN* VI 28 mentions a transaction in which the price paid for a shekel of *amûtum* amounted to almost 35 shekels of silver; cf. Landsberger, *Zeitschrift für Assyriologie*, 38, 1929, pp. 278 f.; J. Lewy: Symbolae Hrozný, IV. *Archiv Orientální*, 18, 3, 1950, p. 424, n. 325. On the other hand, the letter *CCT* IV 4[a] records an offer of 1 shekel of gold, that is, as a rule, 8 shekels of silver (see most recently Hildegard Lewy, *Journ. of the American Oriental Society*, 67, 1947, p. 309) per shekel of *amûtum*; but this offer was rejected as too low.

[8] See *TC* II 22,14 ff.

[9] *KTS* 22[b]; cf. J. Lewy, *op. cit.* (supra, n. 5), p. 18. (On *lakabbum* 'block' see A. Deimel: *Šumerisches Lexikon*, IV. Roma, 1933, No. 483,41.)

[10] See *TC* III 49,41: *ḫu-sà-ru-um du-qú-um*. References to the breaking into pieces of a "stone" of *ḫusârum*, said to weigh twelve minas (thus according to l. 4: *12* MA.NA *ḫu-sà-ra-am*), occur also in the unpublished letter *VAT* 9292; see ll. 13 ff. (*áb-na-am i-na ša-ra-mì-im-ma* [14]*ki-ma ša-ar-ma-at-ni* [15]*li-ik-šu-du-ší*) and cf. *ibidem*, ll. 23 ff. (*i-na ta-da-ni-šu-nu* [24]*i-na ša-ra-mì-im* [25]*li-ik-šu-du-ší*).

to denote an ore than metallic iron. Moreover, from one of the two texts which mention objects made of *ḫusârum* it is clear that the Assyrians possessed seals of *ḫusârum*.[11] This fact makes it virtually certain that *ḫusârum* denoted an iron ore or, to be more specific, haematite, Fe_2O_3. For thanks to numerous finds of seal cylinders, many of which are inscribed with legends naming their owners, it is known that since the times of the Third Dynasty of Ur, that is about two hundred years prior to the period of the Old Assyrian documents here under discussion, seal cylinders were usually made of haematite.[12]

As is indicated by its Greek name αἱματίτης λίθος "bloodstone", this particular form of Fe_2O_3 resembles coloured precious stones. As, furthermore, the peoples of the Near East are known to have used haematite since very early times for the manufacture of beads,[13] rings[14] and the like,[15] it seems only natural that *ḫusârum* should figure in one or two Old Assyrian business letters together with NA_4.ZA.GUL, i.e. with the semi-precious stone which, in view of its Akkadian name *sâmtum,* is commonly identified with carnelian or chalcedony.[16] For the same reasons we are not surprised to learn from one of the few Old Assyrian tablets from Kültepe which are not commercial texts that king Irišum I of Assyria (c. 1941-1902 B.C.) took care that the front side of a throne for the god Aššur which he dedicated to the Aššur temple of his capital city should be inlaid with *ḫusârum* or, as this copy of a royal inscription writes, *ḫušârum*.

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[11] *KTS* 33[b]; see J. Lewy, *op. cit.* (supra, n. 5), p. 18. A cup (*kâsum*) of *ḫusârum* is mentioned in *TC* II 22.

[12] See, *e.g.*, L. Delaporte: *Catalogue des cylindres orientaux du Musée du Louvre* (I, 1920; II, 1923), *passim* and cf. W. H. Ward: *The Seal Cylinders of Western Asia.* Washington, 1910, pp. 5 f.; Unger, *Reallexikon der Vorgeschichte,* IV, 2. Berlin, 1926, p. 366. (As for seal cylinders of haematite which antedate the Third Dynasty of Ur, see Woolley, *op. cit.* [supra, n. 5], pp. 544 ff.)

[13] Cf. Woolley, *op. cit.* (supra, n. 5), p. 369; A. Lucas: *Ancient Egyptian Materials and Industries.* 3rd ed. London, 1948, p. 452.

[14] See Woolley, *op. cit.* (supra, n. 5), p. 528, sub U.8147; p. 591, sub U.14333.

[15] As, for instance, amulets; cf. Thomsen, *Reallexikon der Vorgeschichte,* III. Berlin, 1925, p. 9.

[16] This stone occurs in the Kültepe texts sometimes as *sá-am-tum* (*Contenau* 22,12) and *sà-am-tum* (*BIN* VI 179, x+3; *CCT* III 29,28) and at other times as NA_4.ZA.GUL (*Contenau* 2,5; *TC* III 178,7; *CCT* IV 40[a],5; 24; *BIN* VI 89,4; 16). (The contention of Bilgiç, *Sumeroloji Araştırmaları.* Istanbul, 1941, p. 949 that *CCT* IV 47[a], 30 mentions an amount of no less than six hundred kilograms of "this stone" is, in spite of its endorsement by Landsberger and Balkan, *loc. cit.* [supra, n. 2], p. 235, erroneous; the reference to wool (ŠIG$_4$.HI.A) in l. 26 of *CCT* IV 47[a] makes it abundantly clear that ll. 30 f. deal with 80 talents of white wool and 20 talents of red wool!) Since *CCT* IV 40[a] mentions [abnsâmtum] and *ḫusârum* in close connection, and since *CCT* IV 40[a] and *BIN* VI 89 are parts of one and the same correspondence, it is hardly too daring to restore *BIN* VI 89,3 ff. to 6 MA.NA [^{NA_4}].ZA.G[UL] *ù* 2 MA.NA [*ḫ*]*u-sà-ru*(!).

Landsberger and Balkan, the editors of this important document, not only suggested that *ḫušârum* and *ḫusârum* are variants of one and the same term, but also tentatively proposed that *ḫusârum* was an Old Assyrian designation of lapis lazuli. However, the argument which they adduced in support of their tentative rendering of *ḫusârum* and *ḫušârum* is merely speculative[17] and, as I can add, incompatible with the fact evidenced by two unpublished Kültepe texts that, contrary to the view expressed by Landsberger and Balkan, the Assyrian traders denoted the lapis lazuli which they exported from Assyria to Anatolia as *uqnûm*.[18]

When examining the Assyrian letters acquainting us with the appellative noun *ḫusârum* to which we attributed the meaning "iron ore", "haematite", we cannot fail to note that the word *ḫusârum* recurs in the same sources as a masculine personal name.[19] On the other hand, it is a matter of fact that the Canaanite languages shift long *a* vowels to *ô* and that the Semitic consonant *ḫ* appears sometimes as χ in Greek spelling of ancient Semitic names.[20] Hence we are entitled to raise the question whether the name Χουσώρ, familiar as a divine name from the Phoenician cosmogony as transmitted to us by Damascius, is not identical with our Old Assyrian proper name and appellative noun

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[17] In the opinion of Landsberger and Balkan (*loc. cit.* [supra, n. 2], p. 235), the Assyrian merchants distinguished between lapis lazuli as an article of trade and lapis lazuli used for the manufacture of jewelry and seal cylinders; according to them, only the latter was designated as *uqnûm* (NA_4.ZA.GÌN). While abstaining from correcting the errors committed by Landsberger and Balkan in quoting two Old Assyrian texts relating to NA_4.ZA.GÌN, I take this opportunity to note that their "emendation" of Stephens' reading *3 1/2* GÍN NA_4.ZA.GÌN *3 1/3* GÍN *ba-ba-ar-da-li-am* (*BIN* VI 179,21 f.) to ..... *sú*(?)-*ma-ar-da-li-am* is arbitrary; Stephens' reading is corroborated by *ICK* 161,10 f. (*šì-im e-na-tim ba-ba-ar-da-li-ím*).

[18] The unpublished texts here quoted are *VAT* 9218 and *VAT* 13554. The former includes the following passage: *5/6* MA.NA *4* GÍN [20]*a-na li-bi lu-qú-tim* [21]*ša šé-ep* ^{d}*Šamaš-ṭâb i-na* [22]*kaspim a-nim ni-il$_5$-qí-ma* [23]*nu-ra-dì 3 1/3* MA.NA *kaspam* [24]*ša* NA_4.ZA.GÌN *a-na li-mì-im* [25]*Šu-Ḫu-bur* 3 MA.NA *1* GÍN [26]*a-na ší-im bît Šu-Ḫa-bu-ra*. The latter, a badly damaged fragment, lists in l. 2 [....] NA_4.ZA.GÌN *ù 1 ku-ta-num* and in l. 3 [....]-*ta 1 ku-ta-num ù 1* MA.NA *annakum;* as it goes on to refer to cloths, lead and donkeys, it clearly indicates that NA_4.ZA.GÌN denoted lapis lazuli shipped to Cappadocia together with the usual articles of trade.

[19] See, for instance, *BIN* IV 12,3; 165,5 ff.; 220,3; *CCT* IV 16c,2; 42c,2; 43a,4 ff.; *TC* 7,3; *TC* II 13,2. The passages *BIN* IV 160, 36 ff. and *TC* III 274, 15 in which Bilgiç, *loc. cit.* (supra, n. 16), p. 949, n. 247, finds the appellative noun *ḫusârum* concern likewise a man so named.

[20] Thus, for instance, in the transliterations of the biblical names חָם, חֶבְרוֹן and חֶלְבּוֹן. Cf. further the transliteration (κωμη) Χαμων of the place name חמון in an inscription which was found in the Lebanon region and discussed, inter alia, by M. Lidzbarski: *Ephemeris für Semitische Epigraphik*, I, Giessen, 1902, pp. 335 f., and Z. S. Harris: *A Grammar of the Phoenician Language*. New Haven, 1936, p. 102.

ḫusârum. The answer to this question is obviously in the affirmative. For Philo Byblius tells us that Phoenician tradition attributed the discovery of iron and the art of working it to two brothers, one of whom was called Χουσώρ.[21]

It is hardly necessary to elaborate the fact that this association of the name Χουσώρ with the discovery of iron tends to corroborate our interpretation of the Old Assyrian term *ḫusârum*. But it is permissible to emphasize that the deification of a metal is not so strange as it might seem. An Akkadian explanatory list of gods characterizes silver, gold and copper as divine and identifies these three deities with Anum, Enlil and Ea, respectively;[22] another text identifies (NA_4 AN.NA), that is lead ore, with the goddess Ninmaḫ[23] who, as will be recalled, occupies as creatress of the gods an outstanding place in the Sumero-Akkadian pantheon. Moreover, there are, as I showed a few years ago,[24] strong arguments for attributing the meaning "silver" to the name of *Ḫatta*, the very ancient god after whom the later capital city of the Hittite Empire was originally called **Ḫatta*[25] and *Ḫattu* (<*Ḫattuwa*) and subsequently *Ḫattuša*. To assume that the Phoenicians too saw deities in metals and metal ores and especially in iron and iron ore is, in fact, all the more justified since there is no doubt about their cult of meteorites,[26] the source of the celestial iron which, as is well known, was put to use at the latest in the course of the third millennium.[27] At any rate, the

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[21] See Eusebius: *Praeparatio evangelica* I, 10, 11 f. (ed. Gifford, I, p. 47 f.): ..... γενέσθαι δύο ἀδελφοὺς σιδήρου εὑρετὰς καὶ τῆς τούτου ἐργασίας. ὧν θάτερον τὸν Χουσὼρ [variants: Χρυσὼρ and Χονσὼρ] λόγους ἀσκῆσαι καὶ ἐπῳδὰς καὶ μαντείας· εἶναι δὲ τοῦτον τὸν "Ηφαιστον, εὑρεῖν δὲ ἄγκιστρον καὶ δέλεαρ καὶ ὁρμιὰν καὶ σχεδίαν, πρῶτόν τε πάντων ἀνθρώπων πλεῦσαι· διὸ καὶ ὡς θεὸν αὐτὸν μετὰ θάνατον ἐσεβάσθησαν. Καλεῖσθαι δὲ αὐτὸν καὶ Δία Μειλίχιον· οἱ δὲ τοὺς ἀδελφοὺς αὐτοῦ τοίχους φασὶν ἐπινοῆσαι ἐκ πλίνθων. Μετὰ ταῦτ' ἐκ τοῦ γένους τούτων γενέσθαι νεανίας δύο, καλεῖσθαι δὲ αὐτῶν τὸν μὲν Τεχνίτην, τὸν δὲ Γήϊνον Αὐτόχθονα. Οὗτοι ἐπενόησαν τῷ πηλῷ τῆς πλίνθου συμμιγνύειν φορυτόν, καὶ τῷ ἡλίῳ αὐτὰς τερσαίνειν, ἀλλὰ καὶ στέγας ἐξεῦρον.

[22] See K. 4349 E (*CT* XXIV, 49), ll. x+3 to x+5.

[23] See K. L. Tallqvist: *Akkadische Götterephitheta*. Helsingfors, 1938, pp. 262 f. s.v. An-na.

[24] See Symbolae Hrozný, IV, *Archiv Orientální*, 18, 3, 1950, pp. 377 ff.

[25] That *Ḫatta* was the oldest name of the Hittite capital city is confirmed by the occurrence in the Fourth Tablet of *Šurpu* of the expression *ilâni*^{MEŠ} *šu-ut Ḫa-ta* (E. Ebeling: *Keilschrifttexte aus Assur religiösen Inhalts*, I. Leipzig, 1919, No. 67, l. 15). The analogous expression *ilânû*^{MEŠ} *nu ša mât* ^{al}*Ú-ga-ri-ta*, which occurs in a Middle Assyrian letter found at Ras Shamra and published by Thureau-Dangin, *Syria*, 16, 1935, pp. 188 ff., leaves no doubt that Zimmern, *Zeitschrift für Assyriologie*, 30, 1915-16, p. 197, n. 4, was right in intimating that that expression refers to the pantheon of the Hittite capital city and empire. On other summary invocations of gods which lend themselves to a comparison with the idiom *ilâni šût Ḫatta*, see my remarks in *Hebrew Union College Annual*, 14, 1939, p. 614, n. 139.

[26] For a detailed discussion of the pertinent data see Hildegard Lewy, Symbolae Hrozný, IV. *Archiv Orientální*, 18, 3, 1950, pp. 347 ff.

[27] Cf. Plenderleith, *loc. cit.* (supra, n. 5).

cult of *Ḫusâr* or Χουσώρ is well attested not only by Damascius but also by the occurrence in a late Greek source of the personal name Χουσαράθων which, following Schröder,[28] can well be regarded as a theophoric name meaning "*Ḫusâr* has given".

In view of the development in neighbouring Israel where the divine status of gods such as Noah, Ḥâm, Laban and others[29] was denied at a comparatively early period, it seems, on the other hand, quite possible that the cult of iron, especially of terrestrial iron, was more and more discontinued. Thus may have originated the story, transmitted to us in Eusebius' afore-quoted excerpt from Philo, that iron and the art of working it had been discovered by a certain Χουσώρ to whom, after his death, people accorded divine status. Such a legend in which, as we have tried to show, the discoverer of iron is called "Iron Ore", invites comparison with narratives in which "Man" is the name of the first human being. In other words, it appears that the first statement of the rather complex paragraph in which Philo acquainted his Greek readers with Χουσώρ and his brother (whose name he fails to record) goes back, after all, to a highly archaic tale. A criterion which points in the same direction is the afore-mentioned fact that the term *ḫusârum* is a characteristic of the Old Assyrian texts. In Akkadian sources younger than 1800 B.C. neither the appellative noun nor the proper name can be traced any more. Since this indicates that the meaning of the names *Ḫusârum* and Χουσώρ may have been forgotten as early as the middle of the second millennium, it is perhaps not accidental that Philo, who, as a rule, uses Greek equivalents or Greek imitations of the names of the Phoenician gods and heroes or explains their Phoenician names, did not interpret the name Χουσώρ.

It seems, in fact, that the relevant sources consulted by Philo were somewhat contradictory, and that the only clear information which he found there did not go much beyond a brief statement to the effect that the discovery of iron and its use for various implements was due to two descendants of Samêmrûmos, one of whom was called Χουσώρ. That the pertinent Phoenician sources were contradictory is a conclusion all the more legitimate since, after equating Χουσώρ with Hephaistos, Philo goes on to relate that he was also described as Zeus

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[28] *Die Phönizische Sprache*. Halle, 1869, p. 117, n. 5.

[29] As for the data which attest early cults of Noah, Ḥâm and Laban see, inter alia, my remarks in *Mélanges syriens offerts à R. Dussaud*, I. Paris, 1939, pp. 273 ff.; *Hebrew Union College Annual*, 18, 1944, pp. 473 f. and *ibid.*, p. 434, n. 39.

Meilichios.[30] The fact, duly emphasized by Eduard Meyer,[31] that, in distinction from Philo's sources, the Sidonian cosmology saw in Χουσώρ the son of Oulômos and not a late descendant of Samêmrûmos points likewise to discrepancies in the traditions. But is not the existence of stories as conflicting as these another sign that the legend of Χουσώρ originated in a very early period?

It does not need much consideration to foresee that our proposal to combine data gathered from the Old Assyrian sources with Sanchunyâtôn's story about Χουσώρ is likely to meet with scepticism on the part of those savants who hold that this story has already been elucidated by the numerous references in Ugaritic literature to a mythical personage characterized as a craftsman of outstanding skill and dexterity by his names *Kšr* and *Kšr-w-ḫss* as well as by the kind of the services he rendered to *'Al'iyan Ba'al* and other gods.[32] Hence it is in order to adduce here the reasons why I question the cogency of the usual identification of Χουσώρ with the "craftsman-god" *Kšr*.

As will be recalled, one of the epic texts from Ugarit[33] describes the construction by *Kšr-w-ḫss* of an elaborate palace of enormous dimensions for *'Al'iyan Ba'al*. As this fabulous palace cannot well have been without a roof, we must assume that—at least in Sanchunyâtôn's opinion—*Kšr*'s building activities followed Χουσώρ's discovery of iron. For Philo Byblius credits with the construction of the first roofed habitations a certain Τεχνίτης and his companion, two young men whom he defines as representatives of a generation younger than that of Χουσώρ and his brother.[34] Now it so happens that the name Τεχνίτης amounts to a perfect rendering of the name *Kšr*. In the light of this observation which, incidentally, was anticipated by Gaster[35] when he compared the name *Kšr* with

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[30] For attempts, based upon the unproven assumption of an error in Eusebius' excerpt, to see in the words καλεῖσθαι δὲ αὐτὸν καὶ Δία Μειλίχιον a statement concerning not Χουσώρ but his brother, see Clemen, *Mitteilungen der Vorderasiatisch-Aegyptischen Gesellschaft*, 42, 3, 1939, pp. 50 f. As speculative as these attempts are the proposals to emend the following clause οἱ δὲ τοὺς ἀδελφοὺς αὐτοῦ τοίχους φασὶν ἐπινοῆσαι ἐκ πλίνθων to οἱ δὲ τὸν ἀδελφὸν αὐτοῦ κτλ., all the more so since an emendation to οἱ δὲ τούτους αὐτοὺς τοίχους φασὶν κτλ. would yield a better sense.

[31] *Geschichte des Altertums*, II, 2, 2nd ed. Stuttgart & Berlin, 1931, p. 180 with n. 5.

[32] For a partial list of the pertinent passages see C. H. Gordon: *Ugaritic Handbook*. Roma, 1947, p. 241, sub *kṯr*.

[33] II AB (published by Virolleaud, *Syria*, 13, 1932, pp. 113 ff.), col. IV/V ff.; recent English translations: C. H. Gordon: *Ugaritic Literature*. Roma, 1949, pp. 32 ff.; H. L. Ginsberg apud J. B. Pritchard: *Ancient Near Eastern Texts*. Princeton, 1950, pp. 133 ff.

[34] Cf. supra, n. 21.

[35] *Bulletin of the American Schools of Oriental Research*, 101, 1946, p. 21, n. 4.

Hephaistos' epithet κλυτοτέχνης, it is manifest that Sanchunyâtôn and Philo Byblius did not know of or did not believe in the identity of Χουσώρ and *Kšr*.[36]

It must also be taken into consideration that, to judge by col. VII, ll. 15 f. of the Ugaritic epic cited above, *'Al'iyan Ba'al* was more or less wont to address the builder of his palace as *Kšr bn ym*. In the opinion of Dussaud,[37] who finds in *bn ym* a term for "sailor", this feature confirms the identification of *Kšr* and Χουσώρ because Philo depicts the latter not only as the discoverer of iron but also as the inventor of fishing-tackle and raft.[38] However, it seems less daring to attribute to the epithet *bn ym* its normal sense of "child" or "inhabitant of the sea" and to compare the Ugaritic *Kšr bn ym* and Sanchunyâtôn's Τεχνίτης with that first builder of houses, temples and towns and originator of the Babylonian civilization who (according to a well-known excerpt from Berossos' work *Babyloniaca*[39]) was an inhabitant of the sea and, being called 'Ωάννης, also bore a name which can safely be defined as a synonym of the appellative nouns and proper names *kšr* and τεχνίτης.[40] In other words, it seems possible to see in the Ugaritic tales of *Kšr-w-ḫss* and in the Babylonian story of 'Ωάννης two versions of one and the same old myth which associated the first elaborate building activities with a skilful 'Son of the Sea'. It would, indeed, be worth while to raise in this connection the question whether Γήϊνος Αὐτόχθων who, according to Philo,[41] cooperated with Τεχνίτης, might reasonably be compared with the 'Wise Adapa' or 'Man par excellence' of the Babylonian tales.[42] But a discussion of this intricate problem would take us too far from the subject of this paper.

[36] Whether the writers alluded to by Philo in the clause οἱ δὲ.....τοίχους φασὶν ἐπινοῆσαι ἐκ πλίνθων (cf. supra, n. 21 and n. 30) adhered to another tradition is an open question.

[37] *Revue de l'histoire des religions*, 105, 1932, pp. 269, 298. [38] Cf. supra, n. 21.

[39] Fr. 8 Schnabel; cf. Zimmern apud E. Schrader: *Die Keilinschriften und das Alte Testament*, 3rd ed. Berlin, 1903, p. 535; Ebeling, *Reallexikon der Vorgeschichte*, IX. Berlin, 1927, p. 148.

[40] That 'Ωάννης is a Hellenized form of the Babylonian term *ummânu* (which passed as *'ummânâ* into Aramaic) was felt by P. Jensen: *Assyrisch-Babylonische Mythen und Epen*. Berlin, 1900, p. 302; cf. also Zimmern, *loc. cit.* (supra, n. 39), p. 358, n. 6; Ebeling, *loc. cit.*, p. 148. As regards the synonymy of *ummânu* / 'Ωάννης and τεχνίτης, it is interesting to note that the Syriac version of Acts 19.24 renders τεχνίτης by *bar 'ummânûtâ*; see C. Brockelmann: *Lexicon Syriacum*, 2nd ed. Halle, 1928, p. 89b. [41] Cf. supra, n. 21.

[42] On sources which characterize *Adapa* as "the man (par excellence)" see E. Ebeling: *Tod und Leben nach den Vorstellungen der Babylonier*. Berlin & Leipzig, 1931, p. 27, n. a; Jensen, *Reallexikon der Assyriologie*, I. Berlin & Leipzig, 1932, p. 33. For texts which stress *Adapa*'s extraordinary wisdom by calling him *atra ḫasîsa* and the like, see Jensen, *ibid.*, p. 311; J. Lewy, *Hebrew Union College Annual*, 19, 1946, p. 457; Tallqvist, *op. cit.* (supra, n. 23), p. 249.

The Second Tomb-Inscription of the Royal Steward

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In my article 'The Epitaph of a Royal Steward from Siloam Village',[1] I discussed a three-line inscription written in ancient Hebrew characters, discovered in 1870 by Clermont-Ganneau above the door-opening of a tomb-chamber in Siloam (Silwan) village, near Jerusalem. The article referred to another inscription, engraved on the same rock-façade and situated to the right of the door. This second inscription consists of one line of Hebrew-Phoenician characters, incised in a rectangular sunk panel. Being badly damaged and apparently illegible, this inscription too was cut out of the rock and sent by its discoverer to the British Museum in London.

Clermont-Ganneau did not succeed in reading these mutilated inscriptions. He proposed a tentative interpretation of some of the words of the longer inscription, but had no reading to suggest for the shorter one. To the best of the author's knowledge, the only attempt to decipher this inscription was made by Diringer,[2] who proposed to interpret the three words still recognizable as follows: *Ṣadoq son of Petah* . . . צדק בן פתה. However problematical and unsound this interpretation may appear on thorough examination, it remains valuable as a first attempt and encourages other scholars to try and improve on it.

In this article a different reading will be proposed, based on the same sources as the interpretation of the longer inscription (Pl. 24 B, C).[3]

The panel is 1.32 m. in length and 14 cm. wide. In its right half ten incised letters or remnants of letters are distinguishable. The rest of the panel is so

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[1] *IEJ*, 3, 1953, pp. 137-152, Pls. 8-11.

[2] D. Diringer: *Le iscrizioni antico-ebraiche palestinesi*. Firenze, 1934, p. 106.

[3] The writer wishes to thank Mr. R. D. Barnett, Assistant Keeper of the Department of Egyptian and Assyrian Antiquities at the British Museum, for his ready and continuous helpfulness in this matter, the Trustees of the British Museum for permission to publish both squeeze and photograph of the original inscription, and Mr. M. Gazith of the Israel Embassy, London, for arranging the transport of the squeeze to Jerusalem.

badly defaced that hardly a letter can be traced. The letters are deeply cut, and are generally wider and shorter than those of the longer inscription (Fig. 1).

It seems to the writer that the expectation of finding proper names here has been the main obstacle to a reasonable interpretation. After all, the identity of the owner of the tomb is stated in the longer inscription, the epitaph proper, so that the contents of a *second* inscription on the same tomb are likely to be of a different character. Let us now follow each of the individual letters:

Fig. 1.

The first letter can best be distinguished on the photograph of the squeeze. It is a *ḥêth* of a distinctly square shape with two horizontal bars, the vertical shafts projecting at the lower right and the upper left. On the photographs of the inscription (Pl. 24 B and Diringer)[4] this letter may indeed be erroneously read as a *ṣadê*, but this is due to a casual depression near the lower right and to a misleading effect of light and shade on the incised lines of the letter.

The second letter is a *daleth* forming a regular triangle, its base almost horizontal and its right leg projecting downwards.

The third letter is entirely effaced by a large depression in the stone. Only its upper tip is still preserved. The context and the form of the tiny extant fragment suggest a *rêsh*.

The fourth letter is partly broken, but it can be restored only as a *bêth*.

Next comes a clear-cut *kaf* with a rather elegantly curving long shaft.

The sixth letter too, can best be made out on the photograph of the squeeze. It is partly damaged, but the crossing lines of a *thaw* are clearly visible.

The next two letters are very well preserved. They are *peh* and *hê*, after which the characteristic zigzag lines of a *ṣadê* can be clearly distinguished.[5]

The tenth and last visible character is obviously a *rêsh*, its triangular head and the larger part of its stem being clearly traceable. To the left of the *rêsh* the surface of the panel is badly damaged and the letters (c. 9) are obliterated.

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[4] Diringer, *op. cit.* (supra, n. 2), Pl. XIII, 1.

[5] The only other possible reading is *zayin*.

Having established all the foregoing letters and decided on the only sensible division into words, we arrive at the following reading:[6]

חדר בכתף הצר...

חדר — means room or chamber, frequently an inner room or dark chamber; hence חדרי מות 'the chambers of death' (Prov. vii, 27). Here the word obviously has the special meaning of sepulchral chamber, as paralleled by חדר in a Phoenician tomb-inscription from Malta: חדר בת עלם.[7]

בכתף — In biblical Hebrew the prevalent meaning of כתף is 'shoulder'. It is used figuratively in the sense of 'side' or 'mountain slope' in the description of various borders. Of particular interest is its use in connection with the Jebusite hill just opposite our tomb across the Kedron Valley: ועלה הגבול גי בן־הנם אל־כתף היבוסי מנגב 'And the border went up by the valley of the son of Hinnom unto the south side of the Jebusite' (Joshua xv, 8). Similarly, כתף ים־כנרת (Num. xxxiv, 11), כתף הר־יערים (Joshua xv, 10), כתף מול־הערבה (Joshua xviii, 18), בכתף פלשתים (Isa. xi, 14), כתף מואב (Ezek. xxv, 9), etc., are all meant to designate sides or slopes of hills in their respective vicinities.

Besides its topographical or geographical usage, *kathef* occurs in the description of the Court of the Tabernacle and of the Temple, meaning 'side' of an architectural feature, e.g. כתף הבית הימנית 'the right side of the house' (1 Kings vi, 8), כתפות הפתח 'the sides of the door' (Ezek. xli, 2), כתפות האולם 'the sides of the porch' (Ezek. xli, 26), כתף השער 'side of the gate' (Ezek. xlvi, 19), etc.

Here *kathef* is not related to the preceding *ḥeder*, but is in *status constructus* with the following word which is likely to have a topographical meaning.

הצר — Assuming that these three letters form a complete word, the obvious reading is הַצָּר *ha-ṣur*.[8] The usual meaning of *ṣur* is 'rock' or 'cliff'. It is note-

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[6] The proposed reading was approved by Professors W. F. Albright and B. Mazar in a discussion of the inscription during Prof. Albright's visit to Jerusalem in September 1953.

[7] *Cf. Corpus inscriptionum semiticarum*, I. Paris, 1883, No. 124; N. Slouschz: *Thesaurus of Phoenician Inscriptions*. Tel Aviv, 1942, No. 109 (Hebrew).

[8] At one time it appeared to the writer that the word should be restored הַצּוֹר(י) or הַצּוֹר(ם) meaning 'the Tyrian' or 'the Tyrians' respectively. Thus בכתף הצרי or בכתף הצרם would make an interesting parallel to the nearby כתף היבוסי or to בכתף פלשתים. It is known that a considerable number of Tyrians resided in Jerusalem after Tyrian artisans had been brought here by King Solomon to help in the building of his Temple. ('There dwelt men of Tyre also therein...' Neh. xiii, 16.) The supposed owner of the tomb in question— (Sheban) yahu, Steward of the House—is believed to have been of Phoenician origin (cf. *IEJ*, 3, 1953, p. 151 f.). That a certain spot in or near Jerusalem should for some reason have been named after the Tyrians is not entirely inconceivable, but in the absence of any convincing evidence, this somewhat hazardous hypothesis was dropped.

worthy that this word occurs in the Siloam tunnel inscription, very near this tomb. There we read as follows: '. . . there was a split in the rock (בצר) . . . a hundred cubits was the height of the rock (הצר) above the miners.'

Another interpretation of *ṣur* is 'mountain' (Aram. *tur*). This meaning is rendered by the parallelism in the passage of Num. xxiii, 9: כי מראש צרים אראנו ומגבעות אשורנו which should be translated: 'For from the top of the mountains I see him and from the hills I behold him'.[9]

Both interpretations — rocky cliff or mountain — seem to be applicable in our case. The tomb-structure is situated on the lower part of the north-western slope of the hill called nowadays Mount of Offence, in Arabic Jebel Batn el-Hawa. On the other hand, it is hewn out of a rock-wall forming an upper terrace above the rocky cliffs on the eastern bank of the Kedron Valley.

Thus, the three words of our inscription may be read as follows:

חֻדֶּר בְּכֶתֶף הַצֻּר . . .

(Tomb-) chamber in the side (or slope) of the rock (or mountain) . . .

It is no use in speculating on the continuation of the mutilated inscription, since we have no parallel ancient tomb-inscription with a similar wording.

A tentative suggestion as to why the location of the tomb-chamber was indicated on the tomb itself might be made. The owner of the tomb, (Sheban?)yahu, built his tomb in his lifetime[10] and engraved the one-line inscription first, in order to make it known that the tomb-chamber situated on this particular spot, 'on the side of the rock', was reserved for him.[11] The provisional character of this inscription may perhaps be gathered from its unusual position on the midst of the wall, the epitaph proper having been incised later on above the door-opening. One can indeed distinguish two different hands by comparing the letters of the two inscriptions. Palaeographically, however, they are closely related and may be regarded as approximately contemporary, i.e. dating from about 700 B.C.

[9] Similarly, the element *ṣur* in theophoric names like אליצור and מדהצור may be interpreted as 'mountain', which word became an appellation of the deity. Cf. W. F. Albright: *From the Stone Age to Christianity*. Baltimore, 1940, p. 185.

[10] Cf. *IEJ*, 3, 1953, p. 146.

[11] To cite again Isaiah rebuking Shebna (xxii, 16): . . . 'and (he) that graveth a habitation for himself in a *rock*' (cf. *IEJ*, 3, 1953, p. 151): the original Hebrew has *sela'*, a synonym of *ṣur*.

The Excavations at Tell Abu Matar, near Beersheba*

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PAINTED PEBBLES, ORNAMENTS, AND FIGURINES

We have already noted (supra, pp. 21, 24, and 77) two groups of painted pebbles on the earliest floor of house 127 (level I A). One of these was shaped like a crescent or horn (Fig. 17 and Pl. 21 A) and consisted of fourteen pebbles marked in red ochre with a cruciform mark. The other, which was oval in shape, had 37 pebbles marked with a bar and arranged in two levels. This latter group had been disturbed by wooden stakes driven into it from a higher floor. On the floor of house 135 (level II A) we found another octagonal or cruciform figure (Pl. 21 B) made of pebbles marked with a bar and arranged in rows of 3, 5, 5, 5, and 3 pebbles.[17] The connection between this figure and the small structure built upon it a short time afterwards is not clear; the latter was in any case erected before the building of the wall of house 135 (p. 31 and Fig. 18). Among the stones found in the small edifice was a big pebble which had served as a palette; its flat upper face was still covered with red paint, which had run down all round. Other painted pebbles were found singly in the fillings of most of the houses of Abu Matar. The same marks appeared on them, with the following additional combinations: point, bar and point, double bar, cross and bar, etc. (Fig. 19).[18] The painted pebbles are usually flat and occasionally even stone flakes were used. Often, one of their edges shows traces of working or has been thinned by the removal of small flakes (Fig. 19, Nos. 2, 5, 25, 32).

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* Concluded from *Israel Exploration Journal*, 5, 1955, pp. 17-40, 73-84.

[17] This group was transferred together with its floor to the Museum of the Department of Antiquities in Jerusalem. The arrangement of the pebbles of this figure perhaps explains the number of pebbles in the oval-shaped group in 127; for 21 pebbles define 16 squares (Fig. 18), which were covered by the 16 pebbles of the second level, the sum total being thus 21 + 16 = 37 pebbles.

[18] Some coloured pebbles were also found at Safadi (see p. 125) in the entrance pit of an underground dwelling; they show motifs different from those of Abu Matar (Fig. 19, Nos. 34-36).

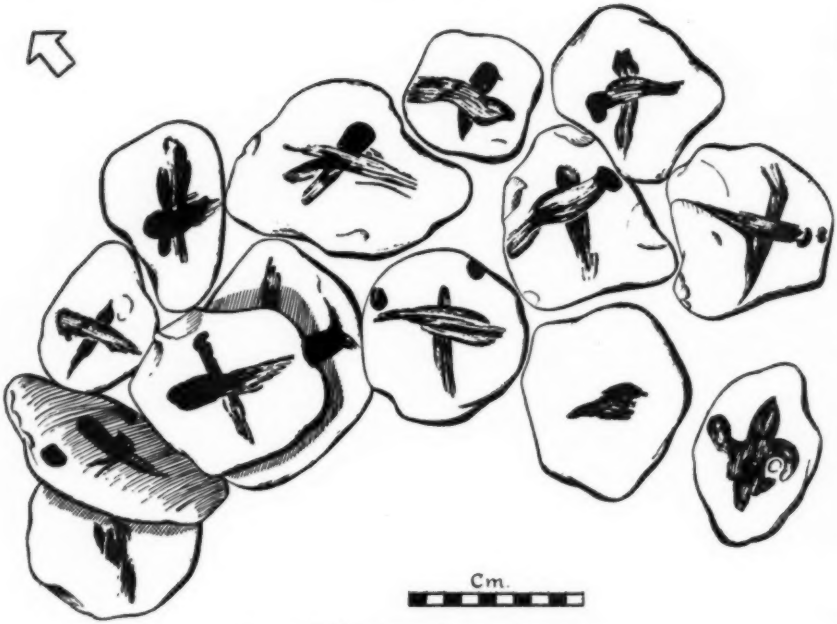

Fig. 17. Pebbles grouped on the floor of 127.

Some pebbles show traces of an earlier painted mark, identical with the later one (Fig. 19, Nos. 17-18); some are marked on both sides (Fig. 19, Nos. 10, 26, 34, 36). A few seem to have been broken intentionally and some to have split in a fire (Fig. 19, Nos. 8, 11, 13, 15, 20, 29). The paint was applied with the fingers. In the crescent of 127 the pebbles were marked after having been put in place and the wet finger carelessly touched the neighbouring pebbles with paint. We also found a dozen palettes, most of which were large, thick, flat-faced pebbles. A big flint point was used to crush the ochre, which was obtained locally. A basalt cupel still shows traces of red ochre and probably served to mix the paint.

These marked pebbles are, as far as we know, the first to be found in the Near East. Though found in a different context, they seem to resemble the pebbles of the Azilian culture in Western Europe, a resemblance which could be explained as deriving from a common psychological background. Yet, in our opinion, the possibility of a remote connection should not be rejected out of hand.[19] These

[19] A Palestinian figurine found at Sha'ar ha-Golan by M. Stekelis (*IEJ*, 1, 1950-51, Pls. 4-5) was compared with similar figurines of the late Magdalenian of South Germany (*Bull. Soc. Préhist. Franç.*, 48, 1951, p. 496). On the other hand, Natufian (Mesolithic) art in Palestine has some striking

pebbles present the same problem as those of the Azilian culture; like the latter, they should be compared with the painted pebbles of Tasmania and the *churingas* of Australia, as well as with the painted pebbles of the ancient Indians in Texas. Their purpose does not thereby become much clearer,[20] but the pebbles of Abu Matar do supply us with a new fact: they were found in their original place and are connected stratigraphically with the setting up of dwellings.

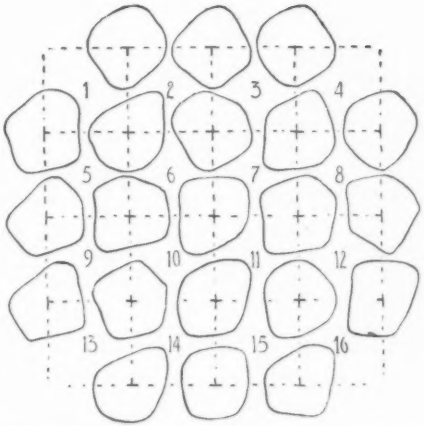

Fig. 18. Schema of arrangement of pebbles in 135.

Multiples of the number 7 are repeated in the composition of these figures, a fact which has already been noted in connection with the ornament of the basalt vases. We find it again in patterns of 49 squares incised on pebbles or in the rock at the foot of the hill of Abu Matar.

Incised pebbles are less numerous than painted ones and the incisions usually form a cluster of lines which makes it difficult to distinguish a motif.[21] One of these pebbles, rather larger in size than the others (Pl. 22C), also shows traces of red and brown paint.

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analogies to that of Magdalenian IV in France. Such similarities are not restricted to art and R. Neuville was right in writing of prehistoric Palestine that 'ses industries sont plus près de celles de la Vézère que de celles du Nil'. Palestine appears today as an Asiatic blind-alley affected (directly or indirectly, and after some lapse of time) by some of the great events which occurred in Europe.

[20] Cf. P. Wernert: *Représentation des esprits des défunts et des ancêtres* (Histoire générale des religions). Paris, 1948, pp. 73-88. In a letter, M. Wernert wrote that he was especially impressed 'et par le dispositif des galets d'Abou Matar et par le fait que les galets d'un assemblage ne portent que de simples barres, ceux de l'autre essentiellement des cruciformes'. As regards painted pebbles, the main sources—apart from the publication of E. Piette—are: A. B. Cook: Les galets peints du Mas d'Azil, *L'Anthropologie*, 14, 1903, pp. 655-660; B. Spencer & F. J. Gillen: *The Northern Tribes of Central Australia*. London, 1904, pp. 257-282; *id.*: *The Arunta: a Study of a Stone Age People*, I. London, 1927, pp. 99-144; A. T. Jackson: *Picture Writing of Texas Indians*. Univ. of Texas Publ. 3809, 1938, Bureau of Research into Social Science, Study No. 27. I have to thank M. A. Hamard of the Centre de Documentation et de Recherches préhistoriques du Musée de l'Homme, for very kindly supplying a full bibliography of the subject, together with some personal observations.

[21] Pebbles, stones, and potsherds with incised signs, some of them cruciform, were observed at Ghassul in Trans-Jordan in the course of excavations undertaken on behalf of the Pontifical Biblical Institute by P. Mallon (A. Mallon: Teleilat Ghassoul, Rapport préliminaire de la 3ème campagne, *Biblica*, 12,

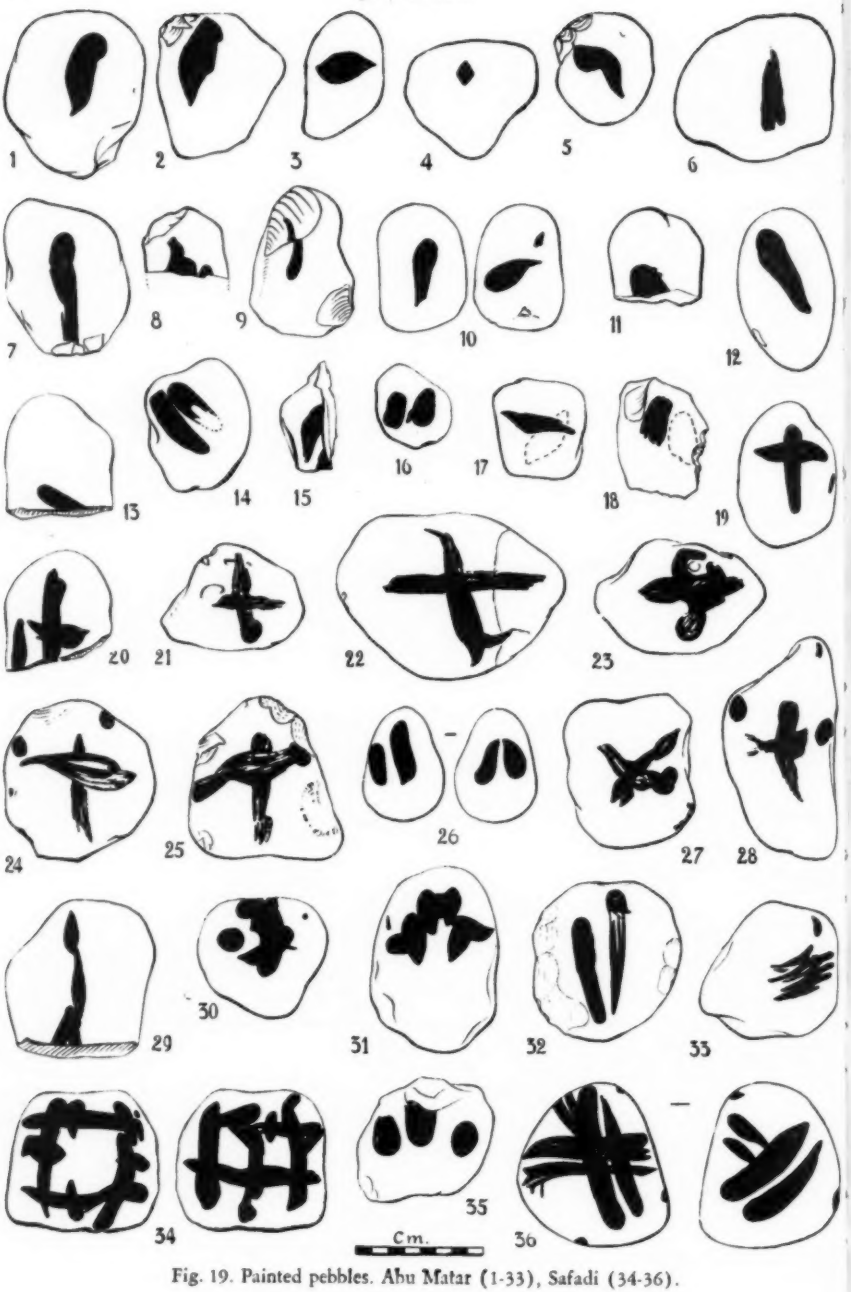

Fig. 19. Painted pebbles. Abu Matar (1-33), Safadi (34-36).

Some soft stones have been shaped with the point of a flint tool; one of these seems to resemble a female torso reduced to a pelvis, the sex being indicated by a triangle. A big oblong stone measuring 0.35 by 0.14 by 0.08 m. was found in dwelling 143; all its sides are very carefully carved, and one of its ends is marked by a deep groove: possibly it represents a phallus.

North-east of the hill, in the small Abu Matar Valley, a projecting rock has been marked with deep grooves and cups connected by small channels, the whole lacking any useful purpose (p. 19, Fig. 2, V and Pl. 24A); below a bulge in the rock were engraved a number of marks resembling those found on the pebbles, and at some distance away, a pattern of intersecting lines. We cannot, however, assign these marks and cups with certainty to any particular period.

Objects of adornment are rather numerous; they are made of various materials. Pendants are most frequent amongst them—small rectangular or trapezoidal plates (Fig. 20: 1-7, 10) made of turquoise, mother of pearl, bone, marble or other kinds of stone, in some cases incised with chevrons; two holes in the upper part seem to indicate that they were attached to a necklace.[22] Other objects of this kind are small mother of pearl circles, sometimes with a serrated edge (Fig. 20: 8, 9, 11, 12). A bone pendant, partly burnt, is shaped like a truncated pyramid and perforated vertically; each of its faces is covered with incised chevrons (Fig. 20: 16). A tubular pendant (Fig. 20: 22) was found in silo X of 127, where it was possibly connected with a burial. Shells (cowries, nerites, etc.) were also prepared for attachment. The big shells of Aspatharia—whenever found complete—show one or several holes for attachment; their purpose might, however, have been more than merely ornamental. Fragments of stone or ivory bracelets (Fig. 20: 23) were also found; we have already noted (p. 79) some parts of a copper necklace (Fig. 20: 21).

Two figurines of unbaked earth represent sheep. The one found in layer 3 of 108 is interesting, as the head is indicated only by horns (Pl. 22D).

In comparison with these objects, two other figurines show evidence of real artistic feeling. One is a bone pin-head (the point broken off) found in the silo

1931, pp. 264-270; see also the correction in *Biblica*, 13, 1932, p. 275, n. 1). It is much to be regretted that these objects were not kept, as many of them were certainly genuine.

[22] On a bone pendant, these holes were shaped like slanting eyes; they were enlarged towards the centre on the obverse and towards the borders on the reverse, so that a string could be passed through them without inconveniencing the wearer. On one of the incised slabs from Megiddo XIX (Inventory No. 38.954 of the Palestine Archaeological Museum) a (praying?) man is represented as having around his neck a trapezoid pendant held by a necklace.

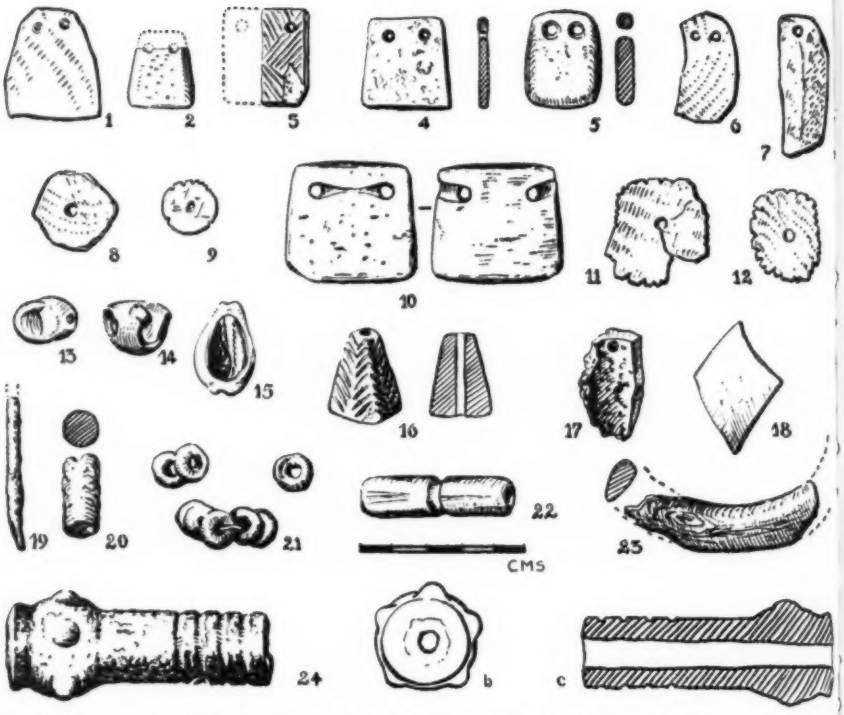

Fig. 20. Ornaments: mother of pearl (1, 6-9, 11-12); bone (2, 10, 16-17, 22); schist (3); turquoise (4); marble (5); shells (13-15); ostrich-egg fragment (18); point, cylinder, and rings of copper (19-21); ivory bracelet (23), copper handle (24—b, c).

of room 145 (level II A). It represents a bird, probably a young pelican,[23] and is 0.045 m. high (Pl. 22 B). The other object of interest is a female figurine of the 'violin' type made of ivory;[24] it is broken off in the middle, the fragment measuring 0.05 m. (Pl. 22 A), and was found in niche 245, in the same dwelling as the pin-head. The face is elongated, the nose very long, the eyes inlaid, and the

[23] This bird is well known in the Palestinian south, which is also visited by many groups of migratory birds, waders, and palmipeds. The cruciform signs on the painted pebbles may possibly represent schematically a bird in flight.

[24] This ivory is not necessarily of African origin. We know that as late as the seventh century B.C. the kings of Assyria hunted the wild elephant in Northern Syria and that the hippopotamus was found in the coastal plain of Palestine until the end of the Iron Age (G. Haas: On the Occurrence of Hippopotamus in the Iron Age of the Coastal Area of Israel (Tell Qasîleh), *BASOR*, 132, 1953, pp. 30-34). More recent excavations at Safadi (cf. *IEJ*, 5, 1955, pp. 125-6) have produced a roundel cut in the incisor of a hippopotamus and several objects made of ivory, including a nude male statuette, 0.33 m. high, identical in style with the Abu Matar figurines.

ears represented by holes; the indication of a mouth is not certain, as the figurine has been damaged. Wherever the surface has been preserved, it is very carefully polished. The top of the head has six holes, connected three by three; two are above the eyes and two are in the back at the same level; one is on the left and one on the right side, on top. The holes in front are not necessary for suspension: possibly they were inlaid.[25]

HUMAN REMAINS

Our attempts to discover a cemetery in the neighbourhood of the hill of Abu Matar have so far been in vain. On the other hand, we have found in the dwellings or in their vicinity the remains (often incomplete) of twelve human bodies: most of them were of young individuals.

In 127, at the bottom of silo X (p. 26, Fig. 6a) was part of a skeleton: complete right arm, right clavicle and manubrium sterni, right iliac bone with the head of the femur, two fragments of the sacrum, and some bones from a foot. These bones belonged to an adolescent about twelve to fifteen years of age. With these bones were found the right humerus and right clavicle of a child of six to eight years. Among the stones heaped up over the bones were a broken limestone mace and a tubular bone pendant.

In a small depression at the foot of the north wall of 127 (p. 22, Fig. 4) was the skeleton of a new-born baby, very badly preserved. The body was lying on its right side, half-crouched, face to the wall. Scattered bones (rotula, foot bone, two cervical vertebrae) of a young adult were found in pit IV near a small heap of white sand (p. 23, Fig. 5). Other bones appeared in pit IX. There were no traces of artificial removal of the flesh.

At the bottom of silo 210 was a human hand with all the bones in position. In silo 117 we found part of an adult skeleton, the bones packed together (Pl. 23 A); the remains included the skull, clearly brachycephalic, but unfortunately it was badly preserved.

Under the small stone construction 177 (Fig. 4, south of 144) lay the complete skeleton of a child of less than seven years of age (Pl. 23 B); the body was lying on its right side, facing south-west, with the legs slightly bent. A many-handled vessel found nearby might be connected with this burial. We have noted above (p. 76) a similar burial under the stone circle 160.

[25] This possibility was suggested to me by M. René Dussaud. The violin-shaped figurines from Palestine (from Ghassul, Wadi Ghazza, and the Theomim [Tawamin] cave) are much more schematic; the details of the face are never represented and they have no holes for suspension.

No human remains were found in room 128 (pp. 22, 26-27, Figs. 4, 6, 7) with the pottery deposit. It is possible, however, that the bones were destroyed when the cave was reopened; perhaps they were even carried away when the site was abandoned at the end of level II A. Niche 126 opened on to this cave through a round window (p. 25 and Pl. 5B); the skeleton of a new-born baby was found under a fireplace, made before the window was closed; possibly we have here the evidence of a funerary rite. A connection between this funerary arrangement and that of the dolmens with perforated slabs[26] is conceivable.

THE BEERSHEBA CULTURE

Abu Matar is not an isolated settlement. On the two banks of the Beersheba Valley, both above and below the Old City of Beersheba, are five to six similar and contemporary sites barely one kilometre's distance from each other (Fig. 21). These are Safadi, opposite Abu Matar on the other bank of the valley, where we have already carried out preliminary excavations; Khirbet el-Bitar upstream, which was partially excavated in 1953-54 by Mr. M. Dothan of the Department of Antiquities; Beersheba Old City near the so-called 'Well of Abraham', under the very houses of the town; another site, more to the east, situated on hill 303; and some remains at Tell Beersheba (Tell es-Sab'), the site of the town in biblical times.[27]

Khirbet el-Bitar was cleared by Mr. Dothan over an area of 800 sq.m.; the upper level consisted of big rectangular houses built upon pebble foundations: immediately below them was a round construction 7 m. in diameter.[28] As at Abu Matar, the walls rested on a stratum of ashes and debris; beneath this level a partial excavation revealed a large oval pit, possibly a dwelling, and other underground installations such as tunnels and silos.

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[26] This does not mean that we accept the attractive theory of the Ghassulian origin of the megaliths and dolmen graves in Trans-Jordan; it seems unfounded in the present state of our knowledge.

[27] These sites, which are quite unrecognizable from a distance, were only discovered as a result of the systematic and patient researches of D. Alon and of Z. Ofer, Keeper of the Beersheba Municipal Museum. At hill 303, a superficial examination has shown that the walls which appear at the surface were built on top of earlier huts and silos.

[28] Cf. the preliminary note in *IEJ*, 3, 1953, p. 262, and, after the resumption of the excavation, in *RB*. 62, 1955, p. 82. The two upper levels of Mr. Dothan (rectangular houses and circular house) belong to what we call the upper level of Beersheba, with Abu Matar IV and the levels at Safadi containing the rectangular houses. I am most grateful to Mr. Dothan for allowing me free access to his material from Kh. el-Bitar.

Fig. 21. Sites contemporary with Abu Matar in the vicinity of Beersheba. *(Drawn by N. Z. Baer)*

At Safadi, preliminary exploration has revealed a similar stratigraphy, with rectangular buildings on pebble foundations in the upper level.[29]

The archaeological material from Khirbet el-Bitar and Safadi is abundant enough for us to observe a complete homogeneity in the implements found at the three sites, and at the same time to note quantitative differences which do not seem purely accidental. These differences seem to indicate a certain degree of specialization for each settlement,[30] the economy of each settlement being at least partly complementary to that of the neighbouring ones. Here we find a confirmation of the impression already given by their geographical distribution, namely, that all these settlements form one economic and social group, the component elements of which settled separately, but close together. This articulation of the group (perhaps already traditional) was made necessary by natural conditions such as water supply and the available area of cultivable land. It is to be hoped that the study of all the sites around Beersheba—and as far as possible

[29] At the end of the third campaign at Abu Matar, in May-June 1954, we excavated at Safadi two underground houses, circular in plan, and observed on the surface traces of walls. We later excavated at Safadi from October 1954 to January 1955 (*IEJ*, 5, 1955, pp. 125-6), with interesting stratigraphical and architectural results. The upper level has two or three strata containing constructions orientated in various directions. The most recent of these includes a dwelling 21 by 6 m., which opens out onto a porch on its south-eastern side. An interesting oval-shaped house was built of stone and rammed earth within an older pit (level II or III); it was covered by a roof, resting on beams, and level with the surrounding ground. This house thus constituted a kind of architectural transition between the underground dwellings and those built on the surface. The settlement was suddenly abandoned at the end of level II, which seems to correspond exactly to level II at Abu Matar.

[30] Thus Kh. el-Bitar and Safadi have produced some fragments of copper ore, but in insignificant quantities compared to Abu Matar; the latter site is also the only one to show evidence of metallurgical activities. One might also mention the great quantity of tranchets found at Safadi, whereas the other sites have only produced a few examples of this type of flint implements.

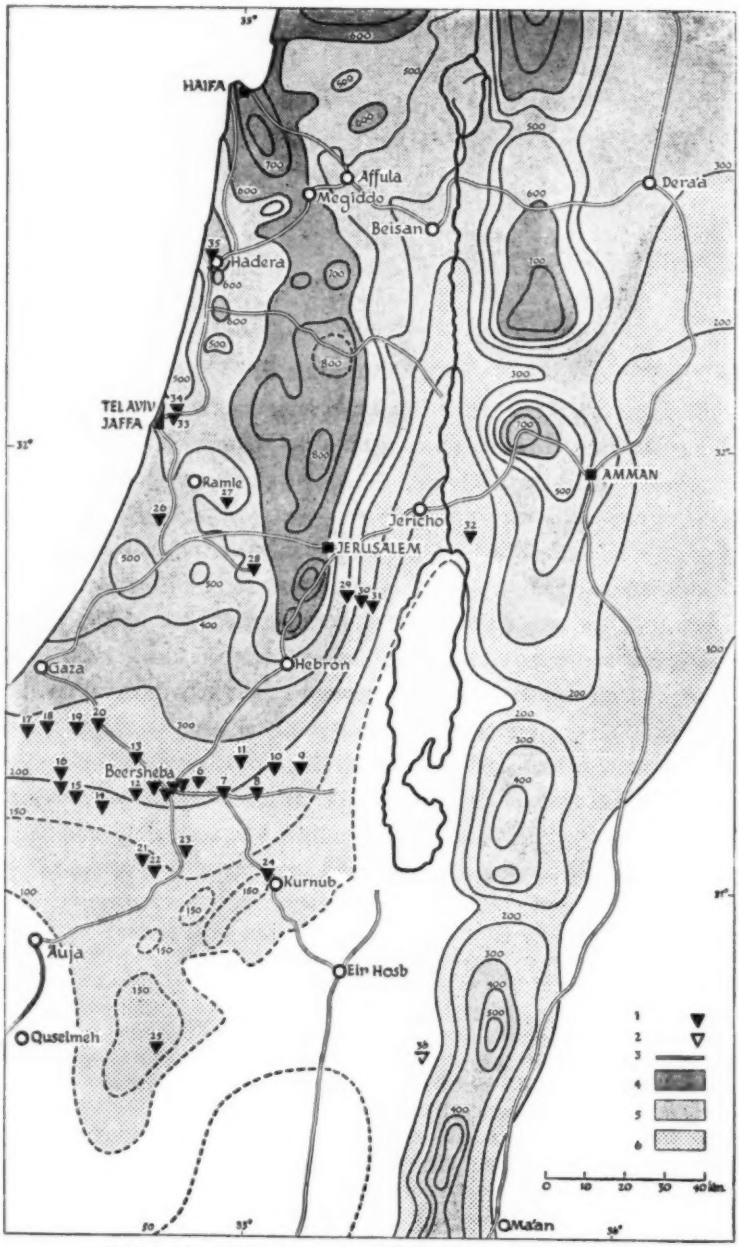

Fig. 22. Sites showing remains of the Beersheba-Ghassul culture.

their complete excavation—will supply us with still more exact information regarding the social organization of this group. We might then be able to arrive at a more complete definition of the Beersheba culture. For the time being this culture, as manifested in the lower levels of Abu Matar, seems to belong to an evolutionary stage, say half-way between the Mesopotamian cultures of Halaf and Obeid; this is not to imply that it was contemporary with either of these cultures.[31]

The Beersheba culture extended over all of the Northern Negev. It is known (Fig. 22)[32] at Mashash (Abu Mishash) to the east of Beersheba (7), at Tell Malḥatha (el-Milh) (8), Tell 'Arad (9), and at Ḥurvath Deragoth (Khirbet Darajat) (10) in the upper Beersheba Valley and its affluents. In the north it appears at Tell Shoqeth (es-Saqati) (11); in the south at Abu Jeradi (23), in the Mashash Valley at Revivim (21) and at Khirbet es-Suweidani (22) in the Revivim Valley, and as far as Makhtesh Ramon at the Ramon Pass (Naqb Sahli) (25); further to the east it is found at Mamshit (Kurnub) (24) on the 'Aravah road; and finally, west of Beersheba, at Abu Yiḥyeh (12) and Abu Muweiliq (14) in the Beersheba Valley, and at Raqiq (Abu Ruqeiq) in the Patish (Zumeili) Valley (13). This last site, which we partly excavated in 1952, has produced pottery and flint implements identical with those of Beersheba. The settlement included surface installations[33]—foundations of huts, fireplaces, and silos—as well as a small stone and brick construction which should be compared with those of Abu Matar (p. 76).

Further to the west, in the lower part of the Besor Valley (called in Arabic successively Wadi Sheneq and Wadi Ghazza), there exist about fifteen sites

[31] Beersheba undoubtedly furnishes a good example of a *Chalcolithic culture* in Palestine; but although it might be convenient—perhaps even somewhat too convenient—to use this term frequently, we would prefer to avoid it, because it has acquired a chronological significance, designating a *period* of the Palestinian civilization, and its use may be misleading. We are by no means sure that the Chalcolithic culture of Southern Palestine is contemporary with the Chalcolithic culture of Northern Palestine. In any case, we will refrain from using the terms Neolithic or Chalcolithic with a chronological significance.

[32] This map was drawn with the assistance of D. Alon and E. Anati. We have not yet been able to check the archaeological material found at Mamshit (Kurnub) and in the Revivim area.

[33] It is possible that underground dwellings exist also at Raqiq (Abu Irqayiq); a sounding in the centre of the hill has produced potsherds at a depth of 4 m.

1—Sites of the Beersheba-Ghassul culture; 2—Punon in Trans-Jordan; 3—Roads; 4—Areas with 600-900 mm. precipitation per annum; 5—do., 300-600 mm.; 6—do., 100-300 mm. Areas with less than 100 mm. average rainfall are unshaded. — Precipitation areas according to Israel Meteorological Service: *Rainfall Map*, 1952. *(Drawn by N. Z. Baer)*

THE DISTRIBUTION OF FLINT IMPLEMENTS IN THE WADI GHAZZA SITES (according to Macdonald)

	TYPES	D^1	M^1	E	O	D^2	M^2	A	B	H	
1	Long tanged arrow-head	o	.	.	.	o	o	.	.	—	Beersheba Facies
2	Isosceles triangular hoe	—	—	—	—	—	.	.	.	.	
3	Long isosceles triangular hoe	—	—	—	—	—	.	.	.	.	
4	Tongue-shaped scraper	—	.	+	.	.	—	.	.	—	
5	Angular scraper	.	.	—	—	.	—	—	.	—	
6	Point	—	—	—	—	—	—	—	—	—	
7	Sickle flint	—	.	+	—	—	—	—	—	o	
8	Slender flake	.	.	.	—	—	—	—	.	.	
9	Microlith	.	.	o	o	—	—	+	+	.	T. Ghassul Facies
10	Bead borer	.	.	.	.	—	+	—	—	.	
11	Fan scraper	.	.	.	.	—	—	+	+	.	
12	Oval scraper	.	.	.	.	.	.	—	—	—	
13	Triangular section hoe	.	.	.	.	.	.	+	—	.	
14	Rectangular hoe	.	.	.	.	.	—	+	—	.	
15	Broad flat hoe	.	.	.	.	.	.	—	.	.	
16	Round scraper	.	.	.	.	.	.	.	.	—	
17	Pick	o	.	.	.	.	.	.	.	—	
18	Sickle (on Canaanean blade)	.	.	.	.	.	.	.	.	—	
19	Long scraper	.	.	.	.	.	.	.	.	—	Egypt. Types
20	Knife	.	.	.	.	.	.	.	.	—	
21	Hollow based lance-head, fish-tailed knife, etc.	.	.	.	.	.	.	.	.	—	

The sign o stands for unique or rare, — for common, + for very numerous.

REMARKS

Type 1: The presence of these arrow-heads has no significance. They belong to various types, some of which are Neolithic and their presence here may be accidental.

Types 2-3 and 13-15: Macdonald designs as 'hoe' implements as varied as regards their use and technique as tranchets, axes, small axes, adzes, picks, etc.; he distinguishes them only by their general shape, which cannot serve as a basis of classification.

Types 4-5: Scrapers made on flakes, uncharacteristic. *Type 6:* True points and gravers on blades and flakes.

Type 7: Common for all the period: blade with blunted back and often also ends; slightly serrated cutting edge. In D 2, M 2, A, and B appears a type with bigger teeth, sometimes retouched on both faces (D 2, A, and B). We have distinguished (*Type 18*) the sickles on Canaanean blades, which appear only in H. *Type 8:* Retouched blades of various types, which cannot be differentiated with the material supplied by the publication. *Type 9:* Small flakes and blades, mostly not retouched and not used as tools; their presence is nevertheless very significant.

Type 10: Small borers. *Types 11-12 and 16:* On tabular flint, cf. n. 37.

Type 14: Picks. *Types 19-21:* Egyptianizing or perhaps even imported.

representing a culture of the same tradition and the same way of life, notwithstanding some variations such as loop handles and pottery decorated in relief. This group, which we may call the Wadi Ghazza group, includes Abu Hureira (20)[34] and Tell Mu'rabi (19) in the Gerar Valley; Bir Sheneq (15), Kissufim (17), Tell Re'im (Jemme) (18), and some small sites between Tell Sharuhen (Far'a) and the Besor bridge (16), excavated by Macdonald.[35] The study of these sites must be undertaken anew in the light of the discoveries at Beersheba. The settlements D, M, E, O, which are the most ancient ones, were founded on thick loess soil, into which big dwellings were deeply cut.[36] On the other hand, settlements A and B were set up on hard soil covered with a very thin stratum of sandy loess (0.5 m.); their founders apparently preferred to live on the surface. If one compares the pottery of D, M, E, and O with that of A and B, one is struck by its homogeneity. In particular, one notes that in all these sites churns have been found identical with those of Beersheba; but the ceramic material coming from each individual site is not sufficiently abundant to justify a classification. The flint industry is, however, much more interesting (Table, p. 178). That of sites D, M, E, O has the facies and composition of the Abu Matar industry (chopping tools have not indeed been recorded by the excavator, but we find them all over the Wadi Ghazza region). The industry of sites A and B and that of the upper strata of D (D2) and of M, second floor, (M2) show a microlithic industry, and the new and frequent use of tabular flint.[37] The group of hoes shows a perceptible Egyptian influence, which is still more evident in site H. The industry of group A and B shows most of the characteristics of the Ghassul facies.

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[34] Flints similar to those of Beersheba were collected at this site by R. Neuville (Notes de préhistoire palestinienne, VI. La station acheuléo-moustérienne d'Abou Khoureireh, *JPOS*, 11, 1931, p. 155 f.).

[35] E. Macdonald, J. L. Starkey & L. Harding: *Beth-Pelet*, II. London, 1932. The differences between the most ancient sites of Wadi Ghazza and those of Beersheba may be explained by the fact that the former region was more exposed to external influences and that it had been previously settled on the coast (Ashkelon).

[36] Macdonald, *op. cit.* (supra, n. 35), p. 2: 'the settlers appear to have cut out their dwellings, very probably from the scarp-edge, though there is no evidence of this. That the existing hut was excavated and not a natural depression there can be little doubt, the walls being almost perpendicular'.

[37] R. Neuville has discovered in the Wadi Falliq (3 km. north-east of Quseimeh, on the road leading from Beersheba towards the Sinai and Egypt) workshops in which fan-shaped scrapers were made, to the exclusion of any other type of instrument. It is possible that very thin tabular flint (Campanian) was exploited in this region; this kind is found in Palestine only in the Judaean Desert. A micro-paleontological study of the flints originating from the Sinai, the Judaean Desert, and various Palestinian sites might possibly furnish more precise evidence.

Outside the Northern Negev, the site of Teleilat Ghassul (32) near the Wadi Jarafa (north of the Dead Sea), which was excavated from 1929 to 1938 by Mallon and Koeppel,[38] revealed a culture which, at that time, seemed distinct from anything hitherto known in Palestine.[39] The Beersheba culture shows all the essential elements of the Ghassul culture and one may compare level IV of Ghassul (the only one known) with the upper level of the Beersheba sites. We shall discuss this relation below, in connection with the 'internal' evolution of the Beersheba-Ghassul cultural complex; here, we shall only define its extent.

In the lower Jordan Valley and in Trans-Jordan Mallon and Glueck compared a certain number of sites to Ghassul on the basis of surface surveys.[40] It now seems desirable, however, to re-examine this material, since we are now able to distinguish the original features of the Ghassul pottery; it has possibly been influenced, together with the pottery from the coastal sites, by northern pottery. In the present state of our knowledge, we can only note the probability that the Ghassul culture extended over the lower Jordan Valley, at the foot of the escarpments leading to the Trans-Jordan Plateau, and along the valleys descending from it.

Even before the discovery of Ghassul itself, 'Ghassulian' remains were found in 1928 by Mallon and Neuville in several of the caves of Wadi Khareitun[41]

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[38] A. Mallon, R. Koeppel & R. Neuville: *Teleilat Ghassul*, I. Rome, 1934; R. Koeppel a.o.: *Teleilat Ghassul*, II. Rome, 1940.

[39] We refer to the controversy over the dating of the Ghassul culture (end of the third millennium or beginning of the fourth), but only in order to point out how different Ghassul appeared from the cultures of Megiddo, Beth Shan, etc. It has always seemed difficult—and for good reasons—to find an appropriate place for Ghassul *within* the cultural sequence based on our knowledge of the northern sites.

[40] Mallon, *op. cit.* (supra, n. 38), pp. 147 ff.: Tell 'Adeimeh, Tuleil el-Ghannam, Tell Iqtanu, el-Mereighat, Tell Munteh, etc., the 'signes distinctifs' of the Ghassul pottery being, in the opinion of P. Mallon 'l'oreillette horizontale, le bord droit et épais, le bord marqué d'empreintes digitales, les empreintes vives à même la paroi'. N. Glueck: Explorations in Eastern Palestine, IV, *AASOR*, 25-28, 1951, notes potsherds similar to those of Ghassul at Kh. Abu Habil (Glueck's No. 161), Kh. el-'Auja el-Fôqa (249), Kh. el-Meshetta (263), Tell el-Adeimeh (227), Tell el-Handaquq (168), Zakhireh (306), Tell Fendi (145), Tell Ghannam (206), Tell Iktanu (219), Tell Qa'adan (183), etc.; often the pottery from these same sites has been compared with that of Megiddo, of Beth Shan, and other northern sites.—The horizontal handles cannot be regarded as a characteristic of the Ghassul pottery, even though some were found on the site. The relief ornament seems to occupy at Ghassul the important place which painted ornament has at Beersheba; this kind of decoration was popular in the north till the end of Early Bronze Age II.

[41] R. Neuville & A. Mallon: Les débuts de l'âge des métaux dans les grottes du désert de Judée, *Syria*, 12, 1931, pp. 24-47. Note the churn handles on Pl. VIII. A new sounding carried out by Neuville in 1933 in the terrace of Umm Qal'a has produced about fifty cornets, very rare at Umm Qatafa. Also found there was a long knife (0.18 m.) of tabular flint with a double notch at one end

(Umm Qatafa (31), Umm Qal'a (30), 'Irq el-Ahmar (29), etc.) on the eastern slopes of the Judaean Mountains, and by Neuville in the Theomim (et-Tawamin) cave (28)[42] on the western slope. These caves seem to have served as temporary shelters along the borders of the Judaean Mountains, the centre of which was undoubtedly still covered by forests.

In the hill zone on the borders of the Shephelah the site of Gezer (27) has produced a kind of pottery which Macalister defines as 'First Semitic',[43] and which Albright has shown to be comparable to that of Ghassul. In the coastal plain the sites of el-Mughar (26) on an affluent of the Soreq Valley (Wadi Qatra), and of Tel Aviv (33) on the banks of the Yarqon River contain, according to Kaplan,[44] remains of a culture closely related to that of Ghassul. The cemeteries containing house-shaped ossuaries at Benei Beraq (34)[45] and Ḥadera (35)[46] on the banks of the Ḥadera River (Wadi Mafjar) belong to this culture both by the associated material and by the way in which the dead were buried after dismemberment.

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so as to facilitate its attachment to a handle (unpublished). At Umm Qatafa, stratum A of the shelter which is situated south of the cave produced in 1949 a big fragment of a painted ossuary of the Benei Beraq type and a spoon of grey stone (both unpublished) together with archaeological material identical with that of the cave itself (cf. R. Neuville: *Le Paléolithique et le Mésolithique du dêsert de Judée*, Archives de l'Instit. de Paléontol. Humaine, Mém. 24, Paris, 1951, p. 26, Fig. 9). In 1950, in a small cave adjoining that of 'Irq el-Ahmar, a Beduin found two basalt vases, one of which was a fragmentary cup on a hollow foot with windows (R. Neuville Collection of the Department of Prehistory of the Hebrew University, Jerusalem).

[42] R. Neuville: Notes de préhistoire palestinienne, I. La grotte d'et-Taouamin, *JPOS*, 10, 1930, pp. 64-75. The fragment described on page 70 and Fig. 1 D is a violin-shaped bone figurine; the material from this cave is typical of the Beersheba-Ghassul culture.

[43] R. A. S. Macalister: *Excavations at Gezer*, II. London, 1912, p. 126, and III, Pl. CXLI, 1-4; CXLIII, 1-2; CXLV, 13. This kind of pottery comes in particular from cave 30 II A, were it appeared together with basalt vases with incised decoration (*ibid.*, II, p. 254, Fig. 402a). The painted decoration around the handles of the vase illustrated on Pl. CXLI, 4, is to be found also at Beersheba (Safadi). After a study of the pottery of Gezer at the Istanbul Museum, Ruth Amiran identified the 'cream ware' of Gezer with the white cream ware of Abu Matar and Safadi.

[44] J. Kaplan, *'Alon*, 3, 1951, p. 29 f. (Hebrew) and *EI*, 2, 1953, pp. 157-160 (Hebrew); also in *PEQ*, 1952, p. 43, and *RB*, 52, 1955, p. 92 f. A small churn has been found at el-Mughar (type Vb of Beersheba) which is the first of its kind to be found complete (*Syria*, 29, 1952, p. 295, Fig. 2). Tel Aviv-Jammasin has produced a big basalt vase with incised decoration, comparable to that of Pl. 18.

[45] J. Ory: A Chalcolithic Necropolis at Benei Beraq, *QDAP*, 12, 1946, pp. 43-57. The excavations on this site were continued by J. Kaplan.

[46] E. L. Sukenik: A Chalcolithic Necropolis at Ḥederah, *JPOS*, 17, 1937, pp. 15-30. The pottery bowls on a high hollow foot with windows found there are imitations of basalt bowls such as were found at Beersheba; fragments of similar pottery bowls were also found at Abu Matar III-IV.

The sites just listed are the only ones in Palestine where remains comparable to those of Ghassul and Beersheba have been found. The lower levels of Megiddo, Beth Shan, Tell Far'a, Affula, etc., have produced a few 'Ghassulian' objects, which appear isolated in quite a different cultural context. We evidently have in North and South Palestine two different Chalcolithic cultures. The one, which we may call the *northern,* extends over Galilee, the Esdraelon Valley, and Samaria; it is known (albeit imperfectly) from levels XX-XIX of Megiddo, XVIII-XVI of Beth Shan, EM-ES of Tell el-Far'a, and from Affula. This culture is of local origin and is derived, as its flint industry sufficiently indicates, from the Neolithic of Sha'ar ha-Golan; it continues without any sudden change into the Early Bronze Age. The other, which we might define as the *southern,* even if it appears to reach fairly far into the north[47] on both sides of the mountains, is found mainly in the Negev and the lower Jordan Valley. We do not know its immediate origins. Its pottery traditions may have influenced the painted vessels of Central Palestine (Ophel, 'Ai, Gezer, Jericho VII) at the beginning of the Bronze Age.[48]

The area of this southern culture (Fig. 22), including as it does many variations in relief and soil quality, yet presents certain uniform characteristics, most important of which—from the point of view of human settlement—is the semi-arid character of the climate. The average annual rainfall remains below 500 mm. in the Shephelah, and diminishes rapidly from 300 to 150 mm. in the

[47] One may find this culture in the Jordan Valley as far as Lake Tiberias.

[48] This cultural duality in Palestine is not surprising. It becomes evident with the first Neolithic cultures, which present even more strict differentiations, such as e.g. the particularism of Neolithic Jericho; it is noticeable till the end of the Early Bronze Age. This duality is closely connected with differences in conditions of the habitat or, more generally, it is conditioned by the very different qualities of soil, climate, fauna, and flora of the two great natural zones of Palestine, the mountains and the high or low plains which surround them. As every culture is but the product of a relation—or rather of a complex of interreactions—between a society and its environment, it appears natural that primitive Palestine should have had simultaneous and different cultures.—The chronological position of the two Chalcolithic cultures we are discussing here requires more precise study, and it would be premature to evaluate it before the assessment of the rich archaeological material of Beersheba. Nevertheless, we have already a strong impression that the culture of Beersheba-Ghassul cannot be earlier than that of levels XVIII of Beth Shan or EM of Tell el-Far'a. It is not even certain that it should precede the Esdraelon culture; the stratigraphical relations observed at Affula (E. L. Sukenik: Archaeological Investigations at 'Affula, *JPOS*, 21, 1948, pp. 1-79) do not refute this position, even if we admit that the finding of two sherds of a bird-vase below a floor of a few square metres at the bottom of a trench does indeed establish the relative position of two cultures; however, the bird-vase appears already in the earliest levels of Abu Matar. Whatever may be the result of a detailed study, we shall have to reduce considerably the length of time which one may assume to have elapsed in Palestine between the end of the 'Neolithic' and the beginning of the Early Bronze Age.

Northern Negev and the lower Jordan Valley. While the mountains of Galilee, Samaria, and Judaea have a sub-humid Mediterranean climate, and therefore favour the development of an agricultural civilization (there is evidence of grain harvests as early as the Mesolithic Natufian), settlement is possible in the Northern Negev only in the narrow belt of loess lands along the valleys, and in the lower Jordan Valley along the well-watered slopes of the Trans-Jordan Plateau. Even there, however, its existence presupposes a dynamic society of an agricultural and pastoral type with a fairly high standard of organization.

While the mountain region seems to have had a fairly dense Neolithic population, the remainder of the country appears to have been almost uninhabited at that time. The coastal plain with its swamps and sandy lands was very sparsely settled, except on the shore itself, as at Jaffa and Ascalon. The mountains around Jerusalem were apparently haunted only by a few backward groups of hunters and shepherds (Tahunian). In the Jordan Valley, Jericho seems to owe its existence to quite exceptionally favourable conditions. The Northern Negev appears to have been uninhabited; the bearers of the Beersheba culture seem to have been the first to settle in this area. With the expansion of the Beersheba-Ghassul culture we therefore witness the first settlement of the less fertile and as yet unpopulated areas of Palestine. This settlement was in any case only temporary, being due to a particular combination of circumstances. Once these passed, the Northern Negev was again abandoned and remained without a settled population until the end of the Early Bronze Age.[49]

BEERSHEBA-GHASSUL

It is difficult at present to estimate precisely the duration of the Beersheba culture; it does not seem to have lasted for more than two or three centuries. In the course of this time the architectural development in the various levels of Abu Matar enables us to distinguish clearly two or even three phases.

The first consists of levels I and II; level I B which separates them shows that the site was abandoned for a very short time. We might even trace an evolution of the underground dwellings of I and II, but it is unlikely that the study of the

[49] Tell Re'im (Jemme), Tell Sharuhen (Far'a), Tell Beersheba (es-Sab'), Tell Malḥatha (el-Milh), Tell 'Arad; south of this line, which corresponded later on to the Limes Palaestinae, a few settlements of Early Bronze IV were recently discovered by E. Anati in the valleys of the Central Negev. This period is well attested for all of Southern Trans-Jordan, where the ancient settlements seem to have undergone the same vicissitudes as those of the Palestinian south.

flint industry and pottery now in progress will reveal a parallel development. At the end of this phase the settlement was again abandoned, and although there is evidence that the inhabitants intended to return, this period of abandonment lasted much longer than the first one (level II B).[50]

The second phase seems to have lasted for a fairly short time; it was connected with a population which has left no trace of its existence other than the fireplaces and, perhaps, the queer stone circles somehow connected with burials. It appears unlikely that we shall be able to define the character of the flint and pottery industries associated with this phase, as it is represented by a stratum which is very difficult to isolate.

The third phase (level IV) is distinguished by the erection of rectangular houses on stone foundations. It appears better represented at Khirbet el-Bitar and at Safadi, where one can see at least two architectural strata. The flint implements and the pottery also seem to indicate an evolution[51]—especially at Safadi. We assume that the study which is being undertaken at present will show this clearly and we believe that the connection already apparent between the upper level of Beersheba and level IV of Ghassul will also be confirmed by further study. We have here not only general resemblances; the flint implements characteristic of Ghassul and most of the motifs of its painted pottery ornaments, as well as the technique, are also evident in the upper level of Beersheba. It is possible that the lower levels of Ghassul, as yet almost entirely unknown, may be compared to those of Beersheba and may parallel the two earlier phases of that site; but it might also turn out that the whole settlement at Ghassul corresponds only to the last phase at Beersheba.[52]

We might call this last phase Ghassulian: this term, however, must be given a more precise stratigraphic and archaeological definition, without restricting its

[50] At Safadi, this abandonment was also observed; there, it seems to have been still more sudden.

[51] When subterranean dwellings are replaced by houses cut out from the ground but with built roofs, one might consider this change as showing a better adaptation to natural conditions, so as to avoid a caving-in of the roof. However, when such habitations are replaced by huge rectangular constructions built on the surface on stone foundations, we must assume that, even if we have here a form of adaptation, it was caused from the outside by a general cultural evolution. The factors governing such an evolution may have been technological or economic, or the influence of a neighbouring culture; all these factors would in various degrees cause modifications of material culture.

[52] The excavators describe walls in lower levels, which were reached by soundings. One might admit that the last phase of the southern culture began at Ghassul somewhat earlier than in the Beersheba region, especially if the cultural evolution represented by Ghassul was caused through contact with the northern culture. It would be of special interest if the Pontifical Biblical Institute could resume its excavations at Teleilat Ghassul.

application to the site of Tell Ghassul. For the earlier phases one may doubt the suitability of such an appellation; for the moment, it seems somewhat premature and a possible cause of confusion. Nevertheless, in order to avoid a still more cumbersome terminology, we may find it convenient to speak of Early Ghassulian (Beersheba lower levels and related strata) and Late Ghassulian (Beersheba upper level, Ghassul IV and related strata).

We might assign provisionally to the Late Ghassulian (allowing of course for a closer examination of the archaeological material as yet mostly unpublished) the sites of the Shephelah and the Sharon, as well as the caves of the Judaean Desert; site H of the Wadi Ghazza seems to follow immediately.[53] To the Early Ghassulian (first phase) we should assign sites D, M, E, O in the Wadi Ghazza; the sites A and B and possibly also Raqiq (Abu Irqayiq), belong to the second phase, which seems to have been marked by changes for which we cannot as yet find a cause, but which resulted in a new facies of the southern culture, viz. the Late Ghassulian.

THE ORIGINS OF THE BEERSHEBA CULTURE

The Beersheba culture appears in the Northern Negev suddenly, and apparently already well adapted to its surroundings. This alone would prove—if such proof were necessary—that it does not represent the expansion of the northern autochthonous population or its displacement by another group. We have thus to look for its origins outside Palestine.

Beersheba shows certain cultural analogies with Egypt and one gets the impression of a distant relationship. However, as soon as one attempts to define this relationship and to establish precise archaeological contacts, difficulties appear at once. Thus the ornamented pin and the ivory figurine of Abu Matar repeat motifs which appear in Upper Egypt from Predynastic times;[54] the style, how-

[53] There is no reason why we should separate the culture of site H from that of the other Wadi Ghazza sites, of which it appears to be the direct successor (cf. the table, p. 178, as regards the flint industry). The presence of ledge handles of the folded type on site H shows that this type of handle is perhaps earlier than Early Bronze Age IV.

[54] Particularly in the Amratian. In the same way, an ivory plaquette found at Safadi in the course of our preliminary work in May-June 1954 could be compared to the flat horns of the Amratian. The fourth campaign at Safadi has produced new data for comparison: several rectangular palettes, beads of white, green, and brown faience(?) and several ivory objects, including the statuette described above (p. 172, n. 24). The subject appears in the Amratian, and later on in Protodynastic Egypt. The Beersheba statuette seems to resemble the Protodynastic figurines by the quality of its execution, but even then its style is different. One could also compare the Safadi statuette with a small basalt statue

ever, is different and the workmanship of the Beersheba objects better than that of the known Egyptian examples. Beersheba has some architectural analogies with Ma'adi (houses dug in the ground) as well as similarities in flints (rough appearance of the tools, Palaeolithic types and techniques) and possibly even in pottery (spouts near the rim, jars with sloping shoulders?). These resemblances are, however, rather general in nature and the differences are the more striking as Ma'adi is not in Upper Egypt, but in the Delta. There are no insurmountable difficulties in relating Beersheba to one or the other of the Predynastic cultures of Egypt, but it is very difficult to establish a synchronism.[55] The undoubted traces of Egyptian influence, which one may observe in the flint industry of the Late Ghassulian, do not furnish an exact chronological indication.[56]

By its geographical position at the gateways of Sinai and Egypt, this southern culture poses the double problem of the roads by which Palestinian and Mesopotamian influences penetrated into Predynastic Egypt. If the origin of the wavy handles of the Gerzean pottery is to be looked for in the horizontal handles of

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now at the Ashmolean Museum (E. Naville: Figurines égyptiennes de l'époque archaique, *Récent travaux*, 22, 1900, pp. 65-70 and Pl. VI): this statuette is considered in Egypt as representing a foreign ethnic type. We might also mention the bearded terracotta statuettes found by Amer Bey in the most recent excavations at Ma'adi and possibly representing Asiatics.

[55] We may note here the presence among the siliceous stone objects at Abu Matar (III-IV) of two big crescents of the type called *crescent shaped drill* by G. Caton-Thompson and E. W. Gardner (*The Desert Fayum*. London, 1934, p. 129 f.). This type of drill was used to hollow out by rotation vases of soft stone. Here it appears, as far as we know, for the first time in Palestine: in Egypt, it belongs to the Protodynastic and to the period of the Old Kingdom. The used edge of the Abu Matar drill has a profile which corresponds exactly to the cavity of the limestone vases which have been found on the site.

[56] From Neolithic Fayum (Caton-Thompson, *op. cit.*, Pl. XI,25; XXII,24) come the prototypes of the small axes with a cutting edge larger than the body found in Wadi Ghazza at M 2 (Macdonald, *op. cit.* supra, n. 35, Pl. XII,13), as also the rectangular axes of A (*ibid.*, Pl. XIII,18-20; XIV,22) and of I (*ibid.*, Pl. XIII, 15) and the arrow-head with a concave base of H (*ibid.*, Pl. XX, 14). The fish-tailed knife of the site H (*ibid.*, Pl. XXII, 16) is a Predynastic type; on the other hand, the fine knife described as a *long scraper* (*ibid.*, Pl. XVIII, end of the second row) is Early Dynastic, possibly Protodynastic (*ibid.*, p. 124, type I, b).—In the caves of Wadi Khareitun, the 'dagger' published by R. Neuville (*Syria*, 12, 1931, p. 27 and Pl. XVI) and the big knife of tabular flint with notches at the base (unpublished) are evidence of Egyptian influence. The same applies to a knife of polished flint found at Theomim (cf. n. 42). In general, we should attribute to Egyptian influence the technical and typological innovations of the Ghassul flint industry, which are to a large extent the result of using tabular flint. It is quite likely that the earliest trade relations between the people of Beersheba and of the Wadi Ghazza region and Egypt by the Sinai road which passes rich deposits of fine tabular flint (cf. n. 37) have resulted in the introduction into Palestine of the processes of extraction and working of this material, together with new types of tools common in Lower Egypt (Ma'adi) where they represent a tradition going back to the Neolithic.

Northern Palestine, this presupposes the existence of commercial relations with Upper Egypt, and we can therefore expect to find some traces of these relations in the southern Palestinian culture—if granted that the culture belongs to this period. But none have been found so far (unless we consider as such the 'northern' character of part of the Wadi Ghazza pottery). It is of course possible that long-distance trading relations leave no traces in the regions of transit; but for the period under consideration one would prefer to assume the use of the sea route, which is attested between Upper Egypt and the Syrian coast since the Early Predynastic period. As regards Mesopotamian influence, it seems likewise improbable that this should have followed the Sinai route without leaving traces on a culture which was as capable as the Egyptian of assimilating Mesopotamian influences.

Since the Beersheba culture was not imported from Egypt, we are obliged by a process of elimination to look for its origins in the east and south-east, i.e. in Trans-Jordan. Archaeological research has barely started in this region and for the period under consideration it remains blank on the archaeological map. Some general considerations, however, may be of interest:

(1) The western border of the Trans-Jordan Plateau, i.e. the regions called in later ages Edom and Moab, shows natural conditions similar to those of the Palestinian south, as far as settlement is concerned. In some respects it is even more favourable (e.g. the annual rainfall of up to 500 mm. in certain localities). The geographical unity of the areas extending on both sides of the 'Aravah is reflected by the historical unity. The great desert fosse has never constituted an obstacle to communication. Nelson Glueck believes that the trade route from Trans-Jordan to the Sinai by way of the Punon Valley was already in use at the end of the Early Bronze Age.[57] It is quite possible indeed that a surface survey as detailed as the one undertaken in the Negev may produce evidence of a culture related to that of Beersheba.

(2) The earliest Neolithic industry of Palestine (of the Jericho-Abu Ghosh type) penetrated into Trans-Jordan, where it appears at 'Amman,[58] and even more to the south; one might connect it to a certain extent with the flint industry

[57] N. Glueck: Explorations in Eastern Palestine, I, *AASOR*, 14, 1933-34, p. 87; II. *ibid.*, 15, 1934-35, pp. 104, 138.

[58] R. Neuville Collection (unpublished); this industry includes arrow-heads, scrapers, borers, and long blades, the technique of which recalls that of Jericho-Abu Ghosh.

of site B in the Wadi Dhobai[59] and one of the industries at Kilwa.[60] The Beersheba flints are, generally speaking, of the same tradition. Moreover, we have on the Kilwa rocks many engravings which are undoubtedly connected with African rock drawings; the earliest may well be Neolithic. A second group, with hammered surfaces, might be compared to those of the Egyptian desert (Wadi Abu Agag, Wadi Hammamat, etc.),[61] which is assigned to Predynastic times. This shows at least that at that time the Trans-Jordanian south was not an empty desert cut off from all outside influences.

(3) A metallurgical industry can only originate and develop in the neighbourhood of metal ores and fuel. The Beersheba industry obviously did not originate in the Northern Negev. The smiths of Abu Matar procured their ores from Trans-Jordan, from the copper lodes of the Punon Valley, at a distance of more than 100 km. from their furnaces. There is also the probability that the workmen of Beersheba brought from the same region the basalt and other hard stones which they commonly employed. All this points to very close trade relations, which may well be explained as following the route of an earlier migration.

SUMMARY

ABU MATAR belongs to a group of small settlements situated on both banks of the Beersheba Valley, above and below Beersheba itself. Four levels of occupation were observed on the site, numbered I to IV from the bottom upwards.

Architecture: (Levels I-II): Underground dwellings dug in the loess, connected by tunnels and entered by shafts or galleries; on the surface, huts, silos, and fireplaces.

(Level IV): Rectangular houses of brick or rammed earth on stone foundations; doors with swivel-stones.

Flint Industry: On pebbles; of decadent technique; archaic types. Principal types of implements: chopping tools, scrapers, borers, sickle blades, a few picks, and axes.

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[59] 200 km. east of the 'Aravah; cf. J. d'A. Waechter & V. M. Seton-Williams: The Excavations at Wadi Dhobai, 1937-1938 and the Dhobaian Industry, *JPOS*, 18, 1938, pp. 176 ff.

[60] In the Jebel Tubeiq massif, near the Hejaz border. Cf. H. Rhotert: *Transjordanien: Vorgeschichtliche Forschungen*. Stuttgart, 1938, pp. 110, 114.

[61] G. Schweinfurth: Über alte Tierbilder und Felsinschriften bei Assuan, *Zeitschr. f. Aeg. Forsch.* 1912, pp. 627-658; H. Winckler: *Rock Drawings of Southern Upper Egypt*, I. London, 1938; II, 1939. Winckler connects the petroglyphs of his 'Earliest Hunters' with the Amratian and identifies the 'Early Nile Valley Dwellers' with the Gerzeans.

Various stones: maces of limestone and haematite; rectangular palettes of limestone; perforated discs, weights, spindle-whorls, pestles, and the lower parts of saddle querns (flint), crescent-shaped drills.

Basalt vessels (large basins and cups on a high hollow foot with windows, incised decoration); bowls and mortars of limestone.

Metal Objects: Maces, ornamented handle, point, rings, and fragments of pure copper, made by casting on the spot. Fireplaces, fragments of furnaces, and crucibles.

Bone Tools: Points, borers, needles, picks, sickles.

Pottery: Hand-made (apart from small bowls and some necks) on weeds; usually underbaked; common painted decoration (bands and arches); relief decoration only in some fingerprints on the lip of a few vases; button handles and lug handles of a vertical type, elongated, pinched but not perforated; no ledge or loop handles. The main shapes are bowls and basins, globular jars with low necks or without one (hole mouth), pithoi, small jars with sloping shoulders, a few vases with many handles, pedestal bowls, etc.

Painted Pebbles, Ornaments, and Figurines: Groups of painted pebbles on the floors of two dwellings; single painted pebbles; incised pebbles. Human and animal figurines, a bone pin decorated with a bird, an ivory amulet figurine representing a female; pendants of mother of pearl, bone, schist, turquoise, and various stones; perforated shells, copper rings, stone and ivory bracelets.

Burials: New-born infants in the houses; infant sacrifice connected with funerary rites(?); dismembered skeletons of adults throughout the settlement.

Population: not very numerous; sedentary; economy agricultural (wheat, barley, lentils) and pastoral (sheep, goats, cattle); copper metallurgy (casting). Trade relations extending to the Sinai Peninsula, the Red Sea and Egypt, but in particular to Trans-Jordan (copper ore, basalt, and hard stones).

The culture of Abu Matar (Beersheba culture) is a Palestinian culture (possibly originating in Trans-Jordan?) which developed in the Northern Negev. In its last stage it is closely related with the culture of Ghassul. The Beersheba culture is clearly different from the Chalcolithic cultures of Northern Palestine; it is distantly related to Predynastic and Protodynastic Egypt, but so far no exact synchronization is possible.

Earliest Palestinian Seal Impressions

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RECENT publications and reports have added three seal impressions to the seven listed by Nougayrol[1] from his 'éneolithique' period. There are in addition the impressions from Tell Jamid[2] and Tell Qurs in the Yarmuk Valley.

(a-b) In the course of excavations at Tell el-Far'a near Nablus, a collared-rim pithos decorated with stamped impressions in the form of a coiling snake and another impression in the form of a scorpion (?) were found in the Early Bronze Age IIa level[3] (Fig. 1). The collared-rim pithoi which are Wright's types VIII c-d[4] are very common at Beth Shan XIII,[5] and Megiddo stages V-III, strata XVIII-XVII.[6] It is noteworthy that in the same level at Tell el-Far'a metallic sherds with combed decoration were beginning to appear. The impressions were arranged vertically on the storage jar and were apparently made by a wooden matrix repeatedly stamped on the wet clay from the neck of the jar down to the shoulder. The design, the scorpion and particularly the coiling snake, are exceptional in Early Bronze Age Palestine. Similar designs are reported from Elam and Tepe Gawra. The coiling snake also appears on the well known protodynastic knife-handle from Gebel Tarif, Egypt.[7]

(c) At et-Tell ('Ay) two sherds[8] were found with a stamped impression. Sherd No. 63 was found in the centre — 'fouille G, chambre 6' — of the palace. From the stratigraphical point of view it is a moot question whether these

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[1] J. Nougayrol: *Cylindres-sceaux et empreintes de cylindres.* Paris, 1939; B. Parker: Cylinder Seals from Palestine, *Iraq*, 11, 1949, pp. 1-43.

[2] G. Schumacher: Unsere Arbeiten im Ostjordanlande, *ZDPV*, 40, 1917, p. 170, Fig. 3.

[3] R. de Vaux & A. M. Steve: La seconde campagne de fouilles à Tell el-Farah, près Naplouse, *RB* 55, 1948, p. 552, Fig. 3.

[4] G. E. Wright: *The Pottery of Palestine from the Earliest Times to the End of the Early Bronze Age.* New Haven, 1937, p. 75, Pls. B, G.

[5] G. M. Fitzgerald: The Earliest Pottery of Beth Shan, *Museum Journal* (Univ. of Pennsylvania), 24, 1935, p. 14.

[6] R. M. Engberg & G. M. Shipton: *Notes on the Chalcolithic and Early Bronze Age Pottery of Megiddo*, Chicago, 1934, p. 38, chart No. 16.

[7] J. E. Quibell: *Archaic Objects, Catalogue Général ... Musée du Caire*, I. Cairo, 1905, p. 237, No. 14265.

[8] J. Marquet-Krause: *Les Fouilles de 'Ay (et-Tell).* Paris, 1949, p. 39, Pl. LXVIII, Cat. No. 63.

sherds belong to the layer of ashes and destruction or to the layer beneath. Yet there are indications that they belong to that remarkable group of finds which includes No. 68, a stone axe, No. 104, a pear-shaped mace-head, and possibly No. 218, a pithos, again of Wright's type VIIId. The design is a scroll akin to the fourfold spiral (Fig. 2). This ornament has parallels at Byblos among

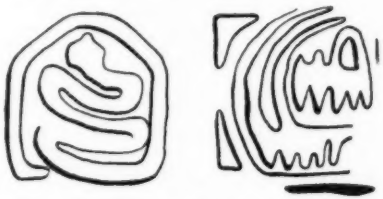

Fig. 1. Tell el-Far'a
(From de Vaux & Steve, *op. cit.*, n. 3, p. 522, Fig. 3)

the 'empreintes éneolithiques'[9] and at Tell Judeideh (level XII); Frankfort compares the Judeideh spiral ornament with impressions from Susa.[10] The spiral, so common in the Late Bronze Age, is not known from any other Early Bronze Age site in Palestine.

(d) The Tell Jamid impression (Fig. 3), a surface find, was described by Schumacher[11] as 'stamped on a biggish vessel of reddish clay well fired'. Glueck, who visited this tell in 1942, reports: 'The very numerous sherds... belonged almost exclusively to EB I-II, with some of them perhaps belonging to EB III.'[12]

Fig. 2. 'Ay
(From Marquet-Krause, *op. cit.*, n. 8, Pl. LXVIII, Cat. No. 63)

Fig. 3. Tell Jamid
(From Schumacher, *op. cit.*, n. 2, p. 170, Fig. 3)

The sherds illustrating this description have collared rims, face combing, platters, hole-mouth rims, and semi-elliptical ledge handles, an assemblage typical of the first half of the Early Bronze Age. The geometric pattern of the

[9] M. Dunand: *Byblia Grammata*. Beyrouth, 1945, p. 38.
[10] H. Frankfort: *Cylinder Seals*. London, 1939, p. 231. [11] Schumacher, *op. cit.* (supra, n. 2), p. 170.
[12] N. Glueck: Explorations in Eastern Palestine, IV. *AASOR*, 25-28, 1951, p. 123.

Tell Jamid impression reminded Frankfort of similar patterns from Byblos and Judeideh, layer XII.[13]

The Jamid impression was made by rolling a cylinder seal along the surface of the vessel. It therefore differs in type from stamped seals. The distinction is of geographical as well as chronological significance. The cylinder seal has always been associated with Mesopotamia and the region of the Upper Euphrates. The stamp seal, on the other hand, is common in Persia, in Anatolia, and in the Aegean area.

(e) A similar rolled impression was found by Glueck on Tell Qurs overlooking the Yarmuk Valley. The sherd is described as hand-made, having a dark brown surface and a dark grey core. A lattice pattern was rolled on it.[14] The pottery from Tell Qurs belongs 'to the first part of Early Bronze and fit(s) into the same picture as the early pottery of Tell Jamid'.

The other Palestinian seal impressions from Megiddo and Jericho[15] belong to the rolled cylinder seal type. They have been compared to Early Dynastic seals from Far'a and Khafaje,[16] on the basis of design and glyptic technique. The archaeological context agrees with an Early Dynastic date. The rolled seal impressions from Jericho were found on a storage jar, apparently an Early Bronze Age pithos. The Megiddo excavators believed that the vessels with rolled impressions belonged either to type 12 N (a hole-mouth jar) or 16 G (a storage pithos with upright neck). Fortunately one rolled impression was found afterwards on the jar photographed as a prototype of 16 G.[17] This pithos has parallels as late as Beth Shan XIII.[18] It is described as hand-made, light brown ware, orange to yellow wash, well finished, usually with undulating and straight raised rope designs of type 15 E, F, and H.[19] It has a low collar neck. One plastic rope decoration goes round the middle of the jar. Other plastic rope decorations are arranged in semicircles on the shoulder. The range of this jar is given as stages V-VII; but as the excavators state that all seal impressions were found in stage V (stratum XVIII), this pithos should be assigned to the beginning of EB II.

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[13] Frankfort, *op. cit.* (supra, n. 10).

[14] Glueck, *op. cit.* (supra, n. 12), Pl. 84:10, p. 130.

[15] E. Sellin & C. Watzinger: *Jericho*. Leipzig, 1913, p. 97, Fig. 66.

[16] *Op. cit.* (supra, n. 6, p. 38, and n. 10, p. 230).

[17] R. M. Engberg & G. M. Shipton: Another Sumerian Seal Impression from Megiddo, *PEFQSt*, 1934, pp. 90-93.

[18] Fitzgerald, *op. cit.* (supra, n. 5), p. 14, Pl. IV, Figs. 11, 17, 18.

[19] Palestine Archaeological Museum, Inv. No. 34.2587.

The impression on jar 16 G was rolled horizontally along the shoulder as well as vertically from near the rim to about the middle of the vessel. This resembles the Tell el-Far'a stamped impressions which were also placed vertically. The Tell el-Far'a pithos has a range at Megiddo covering stages V-III (strata XVIII-XVII).

Later EB cylinder seal impressions found in Syria and Palestine belong, however, to the horizontal cylinder seal rollings only. These remained in use throughout the Early Bronze Age. At Hama[20] rolled impressions, exclusively horizontal, were found as late as Niveau J, which is later than Kh. Kerak. At Kh. Kerak itself a complete rolling on a pithos with flaring rim (Wright's type VIIId) was found. The date given is EB IV.[21]

The earliest Palestinian seal impressions must thus be divided into stamped impressions and cylinder rollings. They have been found as far south as Jericho and 'Ay. Their number increases gradually as we turn to Syria. In Palestine the stamped impressions appear at the beginning of EB II and do not seem earlier than Beth Shan XIV-XIII. The earliest cylinder rollings, both vertical and horizontal, appear on pithoi with upright rims and rail rims, which are also characteristic of the beginning of EB II. Cylinder rollings continue, however, as horizontal friezes (to the exclusion of stamped impressions) on jars with flaring or splaying rims until the end of the Early Bronze Age.[22]

[20] H. Ingholt: *Rapport préliminaire sur sept campagnes de fouilles à Hama en Syrie.* Copenhagen, 1940, pp. 42-43, Pls. XIV-XV.

[21] J. Perrot: Nouvelles découvertes en Israël, *Syria*, 29, 1952, p. 297. The author is indebted to Mr. P. Bar-Adon of the Department of Antiquities for having shown him the seal impressions he found at Kh. Kerak.

[22] My thanks are due to Mr. N. Zori and Mr. Y. Aharoni of the Department of Antiquities for showing me seal impressions found at the foot of Mount Gilboa (el-Karm), and on Tell Hor (Kh. 'Ein Hor) near Ḥanitah, and to Mr. J. Leibovitch for many valuable suggestions.

Who Were the Parents of Athaliah?

H. J. KATZENSTEIN

In the opinion of scholars generally, Athaliah, queen of Judah, was the daughter of Ahab and Jezebel, king and queen of Israel.[1]

The Bible, however, contains two references to Athaliah as the daughter of Omri,[2] and two more as the daughter of Ahab.[3] (Josephus refers to her only as the daughter of Ahab.[4])

This 'double paternity' must be clarified, as well as the possibility that Jezebel was Athaliah's mother. There is little to be said for attempts to correct the text such as are made by Noth,[5] who substitutes the name of Ahab for that of Omri, for no reference is found in the Bible to Jezebel's maternity.

The theophoric names of Athaliah and of the two successors to Ahab, Ahaziah and Joram, have sometimes been used as an argument against Jezebel's motherhood, in view of her 'heathen' inclinations.[6]

The Bible gives three important dates relevant to the parenthood of Athaliah. These are: the age, duration of reign, and year of death of Ahaziah, the king of Judah.[7]

By synchronism with the dates of the Assyrian kings we are able to establish the exact date of the revolt of Jehu, namely 841 B.C. To this date we have to add twenty-two years, the age of Ahaziah when he ascended the throne, and a further year for the period of his rule. By this reckoning we arrive at 864 B.C. as the year of the birth of Ahaziah, king of Judah and son of Athaliah.

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[1] Among the latest: S. A. Cook: *The Cambridge Ancient History,* III. Cambridge, 1929, p. 361; E. Auerbach: *Wüste und Gelobtes Land,* II. Berlin, 1936, pp. 35, 75; J. Morgenstern: Chronological Data of the Dynasty of Omri, *Journ. Bibl. Lit.*, 59, 1940, p. 393; E. Thiele: *The Mysterious Numbers of the Hebrew Kings.* Chicago, 1951, p. 64; H. M. Orlinsky: *Ancient Israel.* New York, 1954, p. 104.

[2] 2 Kings viii, 26; 2 Chron. xxii, 2.

[3] 2 Kings viii, 18; 2 Chron. xxi, 6.

[4] Flavius Josephus: *Antiquities* (Loeb Classical Library), IX, §§ 96, 140.

[5] M. Noth: *Geschichte Israels.* Göttingen, 1950, p. 205; see also A. Lods: *Israel from its Beginnings to the Middle of the 8th Century.* London, 1932, p. 380; T. H. Robinson: *A History of Israel,* I. Oxford, 1932, pp. 294, 349.

[6] Cf. Robinson, *op. cit.* (supra, n. 5), p. 349, n. 2.

[7] 2 Kings viii, 26; in 2 Chron. xxii, 2 we read: 'Forty and two years old was Ahaziah when he began to reign, and he reigned one year in Jerusalem'; the number '42' has to be corrected to '22'; see also the annotations in *Biblia Hebraica,* ed. Kittel-Kahle.

In our calculations we shall not consider the important fact stated in the second Book of the Chronicles,[8] namely: 'And the inhabitants of Jerusalem made Ahaziah his *youngest* son king in his stead; for the band of men that came with the Arabians to the camp had slain *all the eldest* . . .' From this verse it is understood that Ahaziah was the youngest son of king Jehoram of Judah (and perhaps the 'youngest' son of his wife Athaliah too?), which would add a couple of years to the age of Athaliah when she married the king of Judah. But we shall try to prove our theory with reference to the minimum of years.

Assuming, therefore, that Ahaziah was Athaliah's first child, and that her marriage to Jehoram took place in 865 B.C., a year before the birth of Ahaziah, the question of Athaliah's age at the time of her marriage still remains. We may venture to say that Athaliah was about 15 or 16 years old when she married Jehoram, and that in the next year her son Ahaziah was born. Thus Athaliah was born in 881/80 B.C., while Omri, king of Israel, was alive.[9]

Now let us first examine the question whether Jezebel was her mother or an Israelite woman, whose name has not been handed down to us.

According to the list of Tyrian kings given by Josephus[10] from a passage of Menander of Ephesus, the father of Jezebel, Ethbaal, was sixteen years old when he took possession of the throne of Tyre. This was in 887/6 B.C. if we accept the views of Niese[11] and Meyer.[12]

However, according to Rühl,[13] Ethbaal was not 16 but 36 years old when he became king in Tyre in 878 B.C. The reading '36 years old' is to be preferred to the opinion of Niese (and Thackeray), because Ethbaal's son could not have been 39 years old at the time when Ethbaal himself was 48.[14]

This would mean that Ethbaal was not even king when Athaliah was born in 881/80 B.C. Even if we cut down the age of Athaliah at the time of her betrothal to Jehoram to barely 12 years, we arrive at the year 877 B.C., one year after the ascension of Ethbaal to the throne according to Ruehl.

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[8] 2 Chron. xxii, 1.

[9] For the dates of Omri see Thiele, *op. cit.* (supra, n. 1), pp. 60, 283.

[10] Flavius Josephus: *Against Apion* (Loeb Classical Library) I, §§ 121-126.

[11] B. Niese, ed.: *Flavii Josephi Opera*, V. Berlin, 1889, pp. XI-XIV.

[12] E. Meyer: *Geschichte des Altertums*, II,2. 2nd ed. Stuttgart, 1931, pp. 125, 438.

[13] F. Rühl: Die Tyrische Königsliste des Menander von Ephesos. *Rheinisches Museum f. Philologie.* N.F. 48, 1898, pp. 565 ff.

[14] Codex Laurentianus, cf. Niese, *op. cit.* (supra, n. 11), p. 22: the different versions to § 123; Flavii Josephi *Contra Apionem* libri duo. Lyon, 1539, p. 486: 'Hunc peremit Ithobalus Astartae sacerdos, qui cum vixisset annis sexagintaocto, regnavit annis trigintaduobus . . .'

But this hypothesis requires the acceptance of the following assumptions:

(a) that Jezebel became the wife of Ahab in the same year that her father Ethbaal became king of Tyre;

(b) that Athaliah was the eldest child of Ahab and Jezebel;

(c) that Athaliah was 12 years old when she married Jehoram, king of Judah;

(d) that Azariah was Athaliah's first child.

As all these points must be assumed *a priori* to justify the thesis that Athaliah was the daugther of Ahab and Jezebel, obviously a strong case cannot be built on them. The calculations of Rühl seem, therefore, to be erroneous.

The view proposed by Morgenstern[15] is equally unacceptable. Morgenstern thinks that the marriage of Athaliah to Jehoram took place in 885/4 B.C., i.e. two years after Ethbaal became king according to Niese and Meyer (or seven years before that event according to Rühl), and in the year in which Omri started his revolt against Zimri and fought for the throne against Tibni[16] for at least four years.[17]

We have thus to return to the date calculated by Niese and accepted by Meyer, namely that Ethbaal ascended the throne of Tyre in 887/6 B.C. The difference between this date and the date of the birth of Athaliah is six years. If Ethbaal was sixteen when he ascended the throne, and twenty-two at the proposed time of the birth of Athaliah, he would have been grandfather at this age, which is absolutely impossible. Still, the revised view of Meyer (and in some way of Rühl) based *inter alia* on the version of the Codex Laurentianus[18] that Ethbaal was 36 when he took possession of the throne of Tyre, may make it possible for Jezebel to have been a young girl in the first years of Ethbaal's reign.

The question now arises, when did Ahab, who ascended the throne (according to the view of most scholars) in 874/3 B.C.,[19] marry Jezebel?

Shall we accept the verse that 'he (Ahab) took to wife Jezebel the daughter of Ethbaal king of the Zidonians . . .' [20] as meaning that Ahab himself chose Jezebel as his wife when he became king, or did he marrry her during the reign of his father?

It is obvious in any case that Ethbaal would not have given his consent to any marriage so long as the struggle between Tibni and Omri was undecided.

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[15] Morgenstern, *op. cit.* (supra, n. 1), p. 395. [16] 1 Kings xvi, 16-22. [17] 1 Kings xvi, 15 and 2
[18] *Op. cit.* (supra, n. 14). [19] Thiele, *op. cit.* (supra, n. 1), pp. 255, 283. [20] 1 Kings xvi, 31

As Omri became sole ruler around the year 880 B.C., and as this crucial year is identical with the birth-year of Athaliah, or perhaps even lower, the birth of Athaliah to Ahab and Jezebel appears to us impossible. The fatherhood of Ahab might be assumed, but not Jezebel's motherhood.[21]

But what of Omri, whose fatherhood of Athaliah is also quoted in the Bible? We see no reason to ignore it, for Omri, who ruled until 874/3 B.C. was still alive when Athaliah was born.

We may also add that the Syrian version of the relevant verse in Chronicles[22] translates the words: '. . . for he had the *daughter* of Ahab to wife . . .' by the words: '. . . for he had the *sister* of Ahab to wife . . .' [23]

We may, therefore, conclude our argument by saying that Athaliah was the daughter of Omri, after 2 Kings viii, 26 and 2 Chron. xxii, 2 but that she grew up as a young orphan at the court of Ahab, which is indicated by the epithets 'daughter of Ahab'[24] and 'house of Ahab'.[25]

She was educated under the supervision of queen Jezebel and so influenced by that Tyrian princess. This makes plausible the character of Athaliah and her leanings to the Tyrian worship, which she witnessed daily in Samaria and later tried to introduce in Jerusalem.

[21] Thus Noth, *op. cit.* (supra, n. 5), p. 205; Lods, *op. cit.* (supra, n. 5), p. 380; Robinson, *op. cit.* (supra, n. 5), pp. 294, 323, 349, n. 2.

[22] 2 Chron. xxi, 6.

[23] See also the term 'Ahab's sister' used by Y. Aharoni: The Chronology of the Kings of Israel and Judah, *Tarbiṣ*, 21, 1950, p. 98, n. 17, and W. F. Albright in *The Jews, their History, Culture and Religion*, I. New York, 1949, p. 37; but it should be mentioned that Albright calls Athaliah 'daughter of Jezebel' too! (*Historia Mundi*, II. München, 1953, p. 366 f.). There he also makes the statement that Jezebel was the dominant figure in Israel for about 30 years. If, therefore, Jezebel was slain in 842 (according to Albright's chronology) and played a dominant part for a period of about 30 years, she must have married Ahab about 872 B.C., or about 8 years before the birth of her 'grandchild' Ahaziah, king of Judah.

[24] 2 Kings viii, 18; 2 Chron. xxi, 6.

[25] 2 Kings viii, 18 and 27; 2 Chron. xxi, 6; 2 Chron. xxii, 3 and 4.

HEBREW BOOKS AND PAPERS

Papers

ARCHAEOLOGY

The Stratigraphy of the Yarmukian Culture was established by M. Stekelis (*BIES*, 18, 1954, pp. 185-189) by cutting several sections in the Neolithic settlement at Sha'ar ha-Golan. It appeared that the old Yarmuk River had formed a terrace as it retreated in the Middle Palaeolithic period (worn Mousterian-Levallois tools), and over this laid clay on which Neolithic man settled. Fresh floods destroyed this settlement and in their retreat formed a stratum yielding transitional E-MB finds. There are no signs of Chalcolithic occupation on the site.

HISTORY

B. Mazar sums up our knowledge of *Canaan on the Threshold of the Age of the Patriarchs* (*EI*, 3, 1954, pp. 18-32), basing himself on new Akkadian and Egyptian documents and archaeological finds. From the 20th century onwards, Semites moved from Syria to Mesopotamia; Egyptian influence reached its height during the 12th dynasty. The homogeneity of the West-Semitic population of Canaan was disrupted by the Hittite invasions in the 18th century. Politically, Canaan was split into units of various cultural levels; the low-lying regions and those along the trade routes were the more advanced, in particular the cities along the *via maris* and the Royal Route which passed Tadmor (Palmyra) and Kadesh Barnea. The Kushites in the south were a nomadic people who invaded Canaan in the 20th century and were later absorbed by the Midianites. Egyptian sources call Canaan *Rṭnw* 'the land of the princes' (Hebrew *rozanim*). In that period the tribal patriarchal organization of the nomads existed side by side with the city states. The author analyses the 'Proscription Texts' dating from 1800 B. C. (as published by Posener in 1940), and compares them with the list of Sethe (1926); both these lists contain the names of Canaanite rulers and cities. It appears that the Phoenician coast and the Jezreel and Jordan Valleys were at that time the most important areas of Canaan. The Egyptian sphere of influence reached Central Syria and included the coast and the borders of the desert; Canaan was thus a geographical concept even before the Israelite conquest.

S. Abramski in *The Kenites* (*EI*, 3, 1954, pp. 116-124) explains the name Cain as 'craftsman', connected with Tubal-Cain, 'an artificer in brass and iron', and the peoples of Tubal, Meshech, and Javan (according to Ezek. xxvii traders in vessels of brass). The combination of handicrafts, cattle-grazing, and music-making has parallels among nomad peoples to this day. Cain's curse of vagrancy determines the nature of the Kenites as a tribe of nomad craftsmen connected with the Kenizzites, the Edomites, and the Israelites; they were first established in the 'Kenite' Negev (near Arad) and thence spread to the Valley of Jezreel. This spread must have begun before the Iron Age; a 12th dynasty obelisk near the Sinai mines mentions the *Qni*, and even before the proto-Sinaitic inscriptions Semitic nomads were working in these mines.

Counterparts of the Kenites may be seen among primitive peoples in Asia and Africa, where the smith is held in awe and accorded special protection. This corresponds to the story of the 'mark of Cain'—originally not derogatory—and the protection of the Kenites by Midian, Amalek, and Israel. The respect felt by settled agriculturists towards the smith explains the friendly ties between the sedentary Israelites and the Kenites in the days of the Judges and Saul. As nomadic craftsmen, unlike the later sedentary smiths, the Kenites were survivals from the Chalcolithic period.

EPIGRAPHY

N. Avigad publishes *Seven Ancient Hebrew Seals* from the Hebrew University collection; they read: *Šbn'* (Shebna); *Lšm' bn Zkryw* (To Shem'a son of Zakharyo); *Lḥṣy bn Gmlyhw* (To Ḥaṣi son of Gamalyahu); *L'l'z bn 'zr'l* (To Eliaz son of 'Azarel); *Yw'sh Zkr* (Yo'asah [son of] Zekher); *Yw'mn 'bdy* (Yoaman [son of] 'Abdi); *Lyr'* (To Yira). (*BIES*, 18, 1954, pp. 147-153).

B. Mazar publishes *A Hebrew Inscription from 'Illar* found in 1938 in a rock-cut tomb: it reads *Qever Menashe ben Yannai* (Tomb of Manasseh son of Jannaeus). The lettering and formula date the inscription as Herodian: it is the first of that time known in Samaria. 'Illar may have belonged to the Jewish district of Narbata in the period of the Second Temple (*BIES*, 18, 1954, pp. 154-157).

M. Schwabe, in his *Recently Discovered Jewish Inscriptions*, deals with four inscriptions in Greek and one in Aramaic: (1) An ossuary epitaph: 'Heras', paralleled at Monteverde, Rome. (2) 'Judas' in the genitive, on an ossuary from Romema, Jerusalem. (3) A 'thêke of Nonnos and Entolios' on a tomb-door slab from Caesarea (not certainly Jewish). Nos. (4) and (5) are from a bath of the Roman period in Tiberias: one in Greek records on the abacus of a column: 'Abramios the marble worker'; the second, in Aramaic, records the benefactors of a synagogue (*BIES*, 18, 1954, pp. 157-163).

A Samaritan Inscription recently discovered at Kfar Bilu near Rehovoth is published by I. Ben-Zvi (*BIES*, 18, 1954, pp. 223-229). It seems to be connected with the neighbouring site called Kh. 'Asafirah. The inscription is in the Byzantine style and contains the initial words of the verses of the Decalogue, with an opening line containing the first two words of Genesis.

BIBLICAL STUDIES

The Figure of Balaam in Biblical Tradition by J. Liver (*EI*, 3, 1954, pp. 97-100) is based on the identification of Balaam's home ארץ בני עמו with *mât A-ma-e* (Idrimi Inscriptions), in the borderland between Mesopotamia and the Syrian desert. His functions are those of the Mesopotamian *barû* who performed similar duties in Mesopotamian civilization. Such a man might have been summoned from a Babylonian centre to aid the new kingdom of Moab. Thus the narrative in Num. xxii-xxiv must be one of the oldest in the Bible and its prose part antedate the poetic oracles, contrary to current opinion.

M. Held in *An Obscure Biblical Passage and its Parallel in Ugaritic* (*EI*, 3, 1954, pp. 101-103) supports the explanation of בִּגְדֵי שֹׁרֶד as 'priestly garments worn at the divine service' by reference to the verb שרד in the Keret Epic, which means 'to serve' and is cognate with the Hebrew שרת.

REVIEWS

Oṣar ha-Megilloth ha-Genuzoth (The Dead Sea Scrolls of the Hebrew University), edited by E. L. Sukenik; prepared for publication by N. Avigad. Jerusalem: Bialik Institute, 1954. 40 pp., 58 Pls. with transcription, 30 illustrations. IL 16.-. (English edition, Jerusalem: Magnes Press, 1955. $10.00.)

This impatiently awaited book contains a portfolio of 58 facsimile plates and a separate volume of Introductions and Transcriptions. For readers who wish to consult the facsimile this is a slightly awkward arrangement, but the slim booklet of transcriptions will be handy for those who do not have to read the original. The transcriptions are careful, elaborate, and provided with marginal notes on peculiarities of the manuscripts. The numerous lacunae in the Second Isaiah Scroll are filled in from the Massoretic Text (in small print), a method which may be lacking in punctilious scholarly objectivity, but which helps greatly in the reading of the Scroll. The reading of damaged places is not shirked anywhere in the book; the reader enjoys, in fact, without being aware of it, Dr. Avigad's great palaeographical skill. On the other hand, no doubtful readings are suggested; a more daring edition, which would also suggest completions for the lacunae of DSW and DST, is a necessary next step.

The introduction is made up of Prof. Sukenik's earlier descriptions of the Scrolls in *Megilloth Genuzoth* I and II, with some new material added by Avigad, a patchwork unfortunately made necessary by the editor's untimely death.

These three Scrolls are not as well preserved as those which were first in the possession of St. Mark's Monastery and were published by Millar Burrows in 1952 and 1953. The Second Isaiah Scroll, and to some extent the Thanksgiving Scroll, had to be pieced together from little fragments, and both had to be photographed by infra-red rays, as they are practically illegible in ordinary light. Even DSW, perfectly legible in ordinary light and written in a beautifully accurate book-hand, is torn in some places and presented problems in the arrangement of the columns for photography.

The second Scroll of Isaiah (less than a third is extant) seems to be an accurate and 'clean' copy of Isaiah: corrections and erasures are rare, and there are almost no scribal errors. It presents a version very similar to the Massoretic text, but contains a number of textual variants which are duly listed in the Introduction. These are mostly genuine variants, but their direct value for the exegesis of Isaiah is slight. Two big omissions due to homoioteleuton show that even this careful

copy is not perfect; it is, in fact, inferior to the MT. The most important fact about DSIb as a whole seems to be its existence: it represents a textual tradition which contrasts sharply with the proliferation of peculiarities in DSIa. By representing a text either inferior to or almost identical with MT, both Isaiah Scrolls thus confirm, in their own way, the great accuracy of the Massoretic tradition.

The most remarkable of the three Scrolls is the 'War of the Sons of Light and the Sons of Darkness'. It describes how the world is to be conquered by the sect in a planned campaign of 40 years, and one is astonished to recognize the full scope of the aggressive hopes vaguely alluded to in DST and DSD. The War Scroll is, of course, an apocalyptic prophecy and not a pamphlet on power politics, or a textbook of strategy. It is nevertheless remarkable how much the author relies upon tactics: he evidently thinks that God's will is to be done almost without any display of His supernatural powers. God is said to intervene most gloriously in the final battle with His host of angels, but this intervention is not described in the extant part of the manuscript. The earthly efforts of the Sons of Light are much more fully dealt with. These include, besides actual fighting, several devices ensuring God's help, such as pious mottoes on flags and trumpets, strict adherence to laws of ritual purity, and hymns and prayers to be recited at various points in the fighting. The mood is militant: twelve of the 18 columns deal with military matters, and five of these twelve are tactical instructions in the strictest sense of the term. Details, such as the use of a tactical reserve, instructions on the use of weapons of different ranges, and the remark that horses should be 'soft of mouth', show that the martial science of the Scroll is not purely imaginary, but based on at least a partial acquaintance with actual warfare. The Scroll is, in fact, hardly intelligible without some knowledge of ancient fighting methods; conversely, it should be a mine for the history of warfare. As a religious document it displays a very sharply defined dualistic doctrine.

The Thanksgiving Scroll will be more familiar ground to Old Testament scholars. This Scroll seems to be a harmless and not altogether successful attempt to continue the grand lyrical tradition of the canonical Psalter. As much as possible is borrowed directly from the Bible, biblical language and style are imitated, biblical motifs and images are used throughout. As an imitation, these odes are not entirely successful, although they achieve a bizarre beauty of their own. Their exaggerated manner could be best described as baroque, in contrast with the classically restrained mood of the canonical Psalter.

A few of the poems deal with apocalyptic symbols, such as the 'River of Fire' or the 'Eternal Plant', and these require a considerable effort of interpretation. The main subject matter of the Scroll, however, is the author's thanks to God. Nearly all the poems enumerate, with endless repetitions, the many acts of grace which God has performed for the poet, such as the granting of esoteric knowledge, salvation from sin, and leadership in the sect. Thus the Scroll describes a spiritual adventure quite different from that underlyign the Psalter, and the super-

ficial similarity with the Bible is somewhat misleading. The luxuriant verbiage of the Thanksgiving Scroll conceals a poetic exposition of a particular doctrine, which is stated in short pieces of contemplative thought (or 'proto-theology') interpolated in with the poems. The doctrine is similar to the teaching of the Manual of Discipline; its main theme is personal Election to Grace—a subject with which Christian theologians should be more familiar than most Old Testament scholars, and which is in fact rather alien to Jewish thought.

I. DUNKEL

Blanc, H.: *Studies in North Palestinian Arabic: Linguistic Inquiries among the Druzes of Western Galilee and Mt. Carmel*. Israel Oriental Society, Jerusalem. Oriental Notes and Studies, 4, 1953. VI & 139 pp. Map. (Bibliogr. pp. 134-139.) $ 2.00.

The literature on Palestinian Arabic is none too rich. There is a marked lack of detailed studies of the various dialects, in particular those which form distinct groups. The works of L. Bauer: *Das palästinische Arabisch*. 4th ed. Leipzig, 1926; M. Löhr: *Der vulgärarabische Dialekt von Jerusalem*. Giessen, 1905; P. Kahle's grammatical introduction to H. Schmidt's Bir Zeit texts (*Volkserzählungen aus Palästina*. Göttingen, 1918), and other contributions to the knowledge of Palestinian Arabic are of merit primarily in being pioneers in the field, while G. R. Driver's *Grammar of the Colloquial Arabic of Syria and Palestine*. London, 1925, is an attempt to describe too vast an area—an area which is not linguistically well known. Such an endeavour can only be successful if it is based on detailed studies of the main dialects. A study of this sort, and a good one, is the present work, which is part of a Hebrew University doctoral dissertation.

Dr. Blanc undertook the description of some closely related speech-forms existing within a clearly defined religious and social group, the Israel Druzes. A further reason for the choice of this group is, as the author explicitly states (p. 2), that the Druzes are the only Arabic-speaking non-Jewish group left intact within Israel's borders after the War of Independence.

The linguistic study is based on material collected in most of the Druze villages in Israel. Published here are the phonetics and phonemics (chapter two), introduced by background notes (chapter one), and supplemented by selected texts (chapter three). There is no intention to describe all the existing speech differences between villages, for which purpose a dialect map of the area would have had to be drawn. But although the author did not attempt this very difficult undertaking (see footnote 2 to chapter one, p. 111), he points out many important local peculiarities both in the phonetic description (e.g. in discussing the allophones of the phoneme /a/, p. 31) and in the prefatory notes to the text (e.g. pp. 99, 101). The abundant comparisons with other dialects are most interesting. Some of these, especially the ones related to the surrounding non-Druze population, are based on first-hand observation; others are drawn from the dialectological literature.

Blanc's study is one of the first in Arabic dialectology to be carried out in accordance with structural principles: it is based on the phonemic (phonological)

analysis of phonetic material. The first linguist to apply a modern structural method to Arabic dialectology[1] was Z. S. Harris, who in 1942 published a study entitled: The Phonemes of Moroccan Arabic, *Journ. Amer. Orient. Soc.*, 62, pp. 309-318. Very important work has been done in this field by J. Cantineau, to whom we are also indebted for a phonemic analysis of biblical Hebrew (Essai d'une phonologie de l'hébreu biblique, *Bull. Soc. Linguist. Paris*, 46, 1950, pp. 82-122), and classical Arabic (Esquisse d'une phonologie de l'arabe classique, *ibid.*, 43, 1946, pp. 93-140). The phonemic approach, in some repects already apparent in Cantineau's *Les parlers arabes du Ḥoran*. Paris, 1946, was later fully developed in his studies of Moroccan and Tunisian Arabic. These are: Réflexions sur la phonologie de l'arabe marocain, *Hespéris*, 1950—originally a review of the above-mentioned study by Harris—and: Analyse phonologique du parler arabe d'El-Ḥâmma de Gabès, *Bull. Soc. Linguist. Paris*, 47, 1951, pp. 64-105.[2]

In his analytical principles, Blanc is close to the American school of phonemics, if we may refer thus to the major phonemic methods developed in the United States, as distinct from the main European or Prague school. To these principles the author consistently adheres, and methodically this cannot but be approved. A linguist who is not a devoted partisan of the American School may, however, object to certain points. Most important among these is the assumption that separate phonemes can be deduced from 'sounds contrasting with each other or with zero in one position only' (p. 23), a principle which, the author fully admits, would not be accepted by European phonologists. This principle and the desire to achieve a certain 'narrowness' in the phonemic notation led the author to regard /kalb/ and /kalib/ 'dog' as phonemically distinct forms *(ibid.)*. It is true that no hard and fast rules can be fixed for the distribution of the forms, and, as is stated in the detailed discussion of clusters (pp. 74-78), there exists a great measure of free variation between the forms, especially in external open juncture.[3] This, however, does not seem to me to justify the distinct notation.

A fundamental problem related to this question is whether morphophonemic considerations should be introduced into phonemics. In presenting his system of notation (p. 22), Dr. Blanc tends to regard these considerations as irrelevant at the level of phonemics. But even the most orthodox American phonemicist would grant that there is room to doubt whether phonemics and morphophonemics should be kept absolutely apart, no exception admitted. Needless to say, in the process of phonemic analysis criteria which do not involve considerations from

[1] It should be pointed out that some previous studies in this field were carried out by a method quite close to the phonemic. Among these G. Bergsträsser's *Zum arabischen Dialekt von Damaskus*. Hannover, 1924, deserves special mention.

[2] The recent work of H. El-Hajje: *Le parler arabe de Tripoli (Liban)*, has not yet reached this reviewer. It is to be expected that this work, which was carried out under Cantineau's supervision, is also based on a phonemic analysis.

[3] For an explanation of the term juncture, see infra, p. 204.

a later level are always to be preferred, but it is often difficult to exclude morphophonemic criteria at the phonemic level.[4] In fact, Blanc does take morphophonemic considerations into account in his phonemic notation of the 'compound phonemes' (pp. 42-49) such as /i:/ and /u:/ (p. 44). In this notation he is in my opinion right, although at first it is rather difficult to get used to such notations as /bi:t/ 'house' and /ṯu:r/ 'ox', and it is *morphophonemics* which supplies the main justification for the notation.

A phonemic analysis requires a study of the prosodic (also called suprasegmental, supralinear) features of the dialect. Here we are concerned not with isolated sounds, but with their forms of succession in utterances and the way in which they really appear to exist in regular connected speech. Blanc clearly presents the various forms of juncture ('the manner in which utterances are joined together in connected speech' — p. 23) which occur in the dialect (pp. 23-26) and constantly refers to them in the descriptive exposition. As far as the present writer knows, little attention has been paid in Arabic dialectological studies to the role of juncture in speech. The problem is somewhat complicated, and Blanc deserves praise for the way in which he handles it in this work. It may be remarked, however, that the question of intonation (which may be defined as the pattern of variations occurring in the pitch of the voice) is only briefly dealt with. An elaborate description of some types of intonation patterns would have been of much value.

Dr. Blanc's studies are of interest not only to the linguist and the Arabist. The introductory chapter describes the locale (pp. 5-6) and gives an annotated list of Druze villages (pp. 17-21); there are interesting notes on the historical background of the villages (pp. 6-9), and a discussion of the characteristics of the Druze community (pp. 9-17). I. Ben-Zvi's The Druze Community in Israel (*IEJ*, 4, 1954, pp. 65-76), and Blanc's studies[5] form the best introduction to the Druzes of Israel. It is understood that only a relatively small part of the texts collected by the author was published in the book. The texts, which are phonemically transcribed, are translated and annotated. One of them is of interest for the history of the Ḥoran Druze (pp. 80-87); others are concerned with Druze experiences in the Israel War of Independence (pp. 101-104), or enable the reader to get a grasp of Druze legends (pp. 96-97) and popular anecdotes.

S. MORAG

[4] Cf. Z. S. Harris: *Methods in Structural Linguistics*. Chicago, 1951, p. 111.

[5] Besides the introductory chapter in the work reviewed, the author has dealt with some general aspects of the Druze in a paper entitled: Druze Particularism: Modern Aspects of an Old Problem. *Middle Eastern Affairs*, 3, 1952, pp. 315-321. See also his articles in Hebrew in *Molad*, 68-69, 1954, pp. 79-83, and in *Karmelit*, 1954, pp. 223-231.

Erratum: IEJ, 5, 1955, p. 166, line 14: read בְּכֹחַךְ instead of בְּכֹחֵךְ.

A: Group of painted pebbles on the floor of 127.

B: Painted pebbles in 135.

PLATE 22

A: Ivory amulet (height 0.05 m.).

B: Bone pin-head shaped like a bird (height 0.045 m.).

C: Incised pebbles.

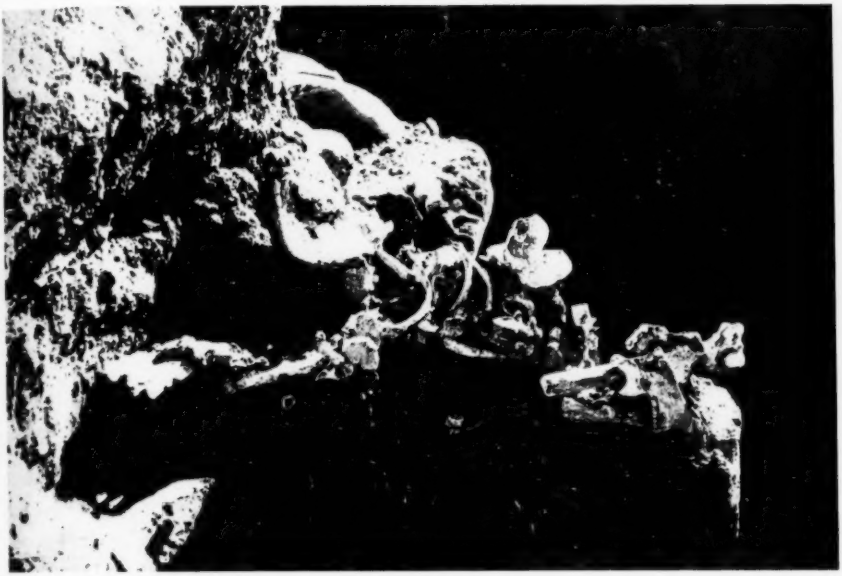
D: Animal figurine of unbaked earth.

A

B

C

D

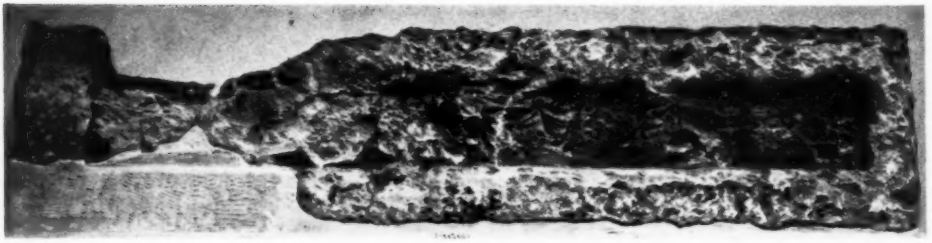


A: Part of skeleton of an adult on the floor of silo 117.

B: Skeleton of a child in 177.

A: Cup-marks and signs cut in the rock at the foot of the hill.

B



C

B: The original inscription. C: Squeeze of the inscription, right-hand part.

ABBREVIATIONS

AAA	Annals of Archaeology and Anthropology
AASOR	The Annual of the American Schools of Oriental Research
'Alon	Bulletin of the Department of Antiquities of the State of Israel
BA	The Biblical Archaeologist
BASOR	Bulletin of the American Schools of Oriental Research
BIES	Bulletin of the Israel Exploration Society, continuing:
BJPES	Bulletin of the Jewish Palestine Exploration Society
BRCI	Bulletin of the Research Council of Israel
CRAI	Comptes-rendus de l'Académie des Inscriptions et Belles-Lettres
EI	Eretz-Israel: Archaeological, Historical and Geographical Studies, published by the Israel Exploration Society
IEJ	Israel Exploration Journal
JNES	Journal of Near Eastern Studies
JPOS	The Journal of the Palestine Oriental Society
PEQ	Palestine Exploration Quarterly, continuing:
PEFQSt	Quarterly Statement of the Palestine Exploration Fund
PJb	Palästinajahrbuch des Deutschen evangelischen Instituts für Altertumswissenschaft des Heiligen Landes zu Jerusalem
QDAP	The Quarterly of the Department of Antiquities in Palestine
RB	Revue biblique
ZDPV	Zeitschrift des Deutschen Palästina-Vereins

MT	Massoretic Text of the Old Testament

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